Pit and Quarry

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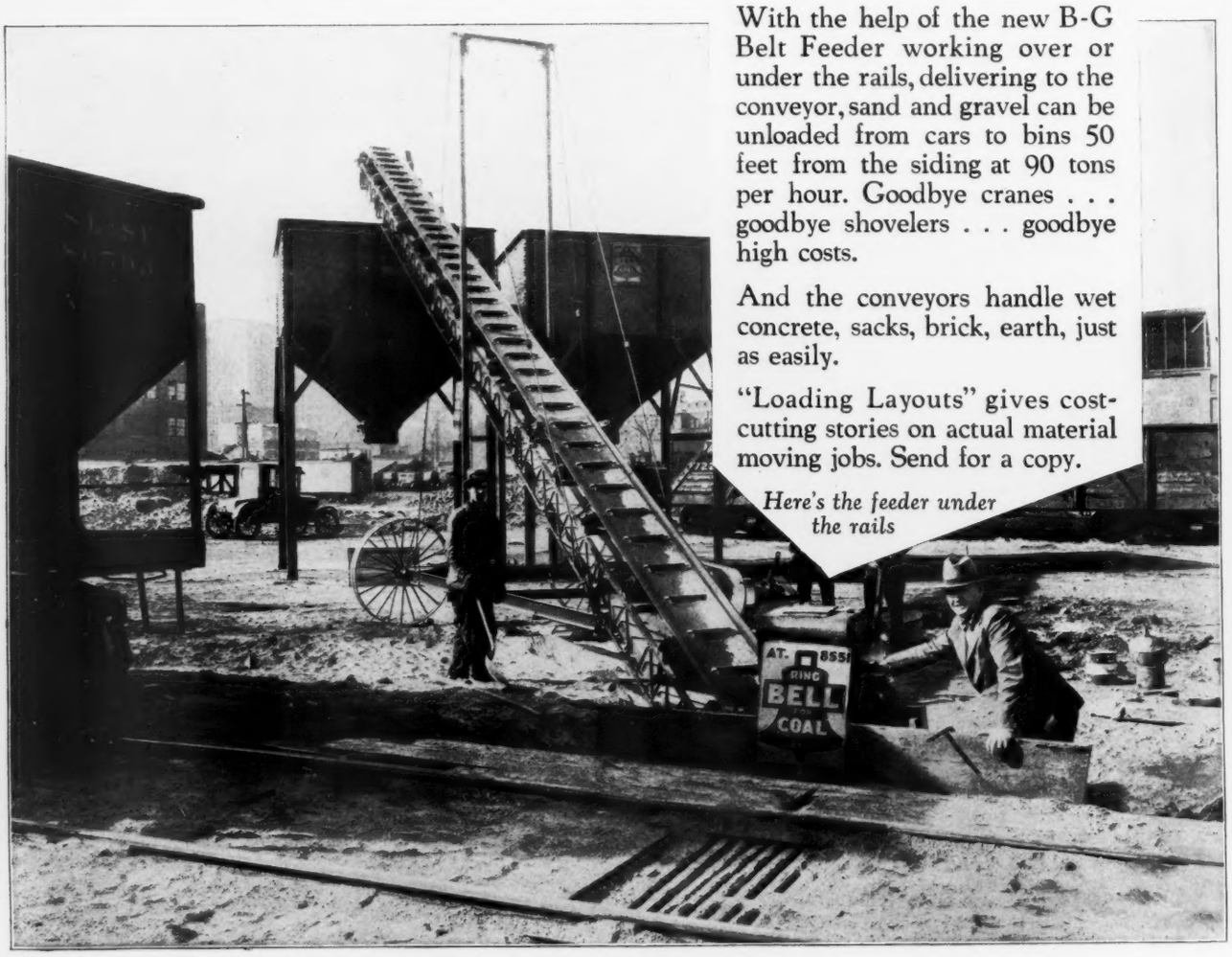
New Ideas—New Costs

EASIER to move and far cheaper to operate, Barber-Greene Portable Belt Conveyors can load bins from trucks, hopper-bottomed cars, or storage as fast as cranes costing five times as much.

With the help of the new B-G Belt Feeder working over or under the rails, delivering to the conveyor, sand and gravel can be unloaded from cars to bins 50 feet from the siding at 90 tons per hour. Goodbye cranes . . . goodbye shovelers . . . goodbye high costs.

And the conveyors handle wet concrete, sacks, brick, earth, just as easily.

"Loading Layouts" gives cost-cutting stories on actual material moving jobs. Send for a copy.



Here's the feeder under the rails

BARBER B G STANDARDIZED MATERIAL-HANDLING MACHINES **GREENE**

BARBER-GREENE COMPANY

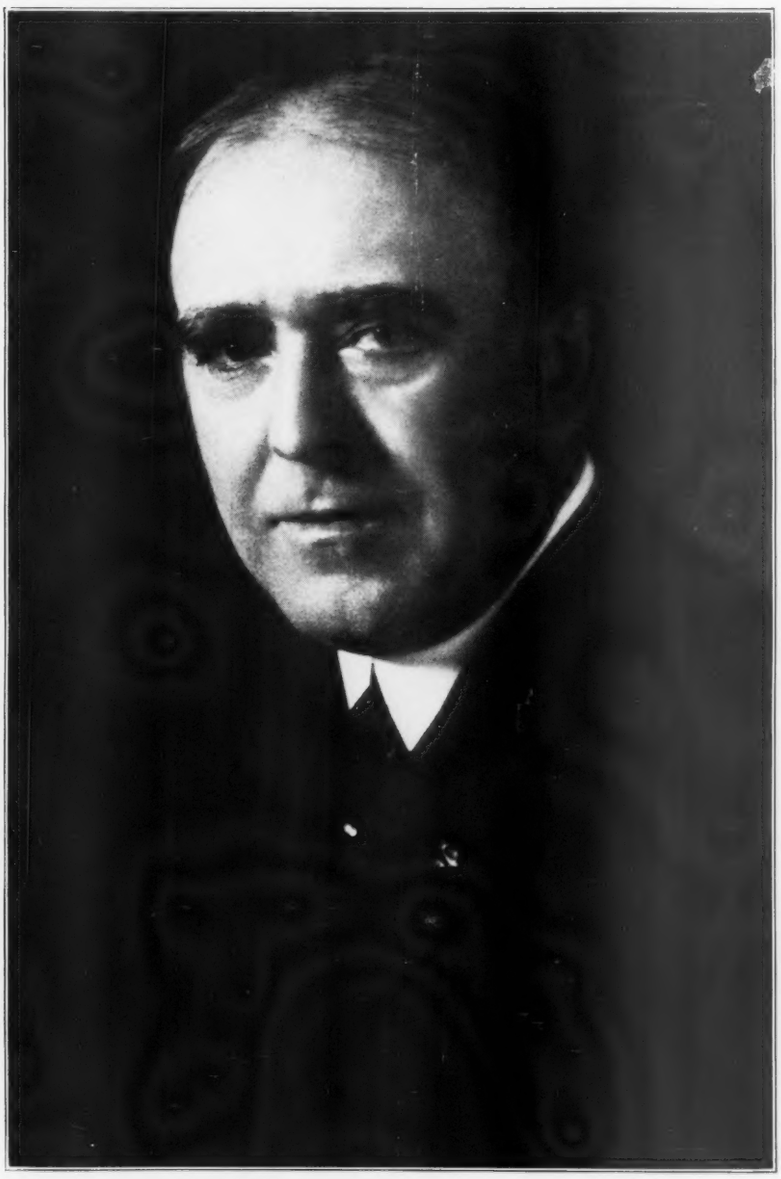
492 W. Park Avenue, Aurora, Illinois

Pit and Quarry

Vol. 17 CHICAGO, ILL., MARCH 27, 1929 No. 13

MEN OF THE INDUSTRY

The portraits printed on this page in each number of PIT AND QUARRY are taken from our files and their selection is without significance as to current events or as to the position of the individual in the industry.



George A. Rogers

Mr. Rogers is Chairman of the Board
Consolidated Rock Products Company
and
President, Union Rock Company,
Los Angeles, California

Little Falls Sand and Gravel Company's Plant Spans a River in New Jersey

THE Little Falls Sand and Gravel Company is one of the smaller plants operating in the Metropolitan area of northern New Jersey. It is within five miles of such markets as Paterson, Montclair, Caldwell, Verona, Bloomfield, Glen Ridge, Passaic, Clifton, Great Notch, and Little Falls. All shipments are made by trucks, which are owned and operated by local trucking concerns.

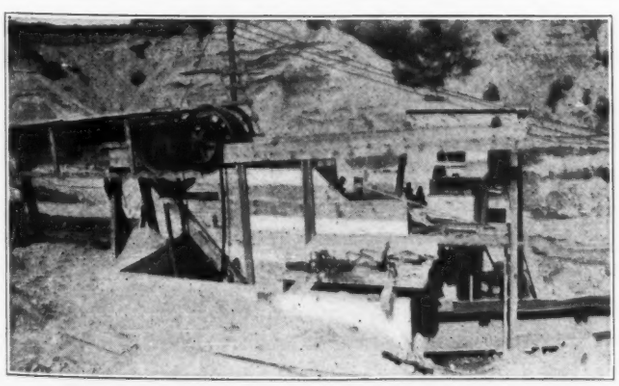
Two sizes of gravel are produced, 1½-inch and ¾-inch; and two kinds of sand, a state specification concrete sand and a fine bituminous or plaster sand. The plant produces approximately 500 cubic yards of materials daily: 350 cubic yards of sand and 150 cubic yards of gravel. Its capacity is approximately 500 cubic yards per 10-hour day.

The bank is of varying height, ranging between 50 and 105 feet. The upper two-thirds of the bank is sand, with an occasional layer of gravel, while the bottom third is all gravel. Some very large trap-rock boulders are encountered in the lower section of the bank, the largest one so far being 18 feet by 15 feet by 12 feet. These boulders are drilled and blasted and then run through the mill as gravel.

Stripping is necessary to remove the top soil which varies in thickness, from 3 feet to 6 feet. The overburden is handled by a steam shovel which loads into trucks which, in turn, dump into the worked-out portion of the pit.

The valuable material is excavated by a 2-cubic yard Sauerman Crescent scraper operated by a Thomas special scraper hoist. The scraper discharges into a hopper which feeds a 20-inch conveyor belt which carries the material to a set of Link-Belt conical screens.

All of this plant's equipment is electrically driven, 60-cycle, 220-volt current being used. A total of 385 horsepower is required.



Crusher Between First and Second Conveyors

One of the Trap Rock Boulders

All blocks used are 20-inch Sauerman Durolite roller bearing.

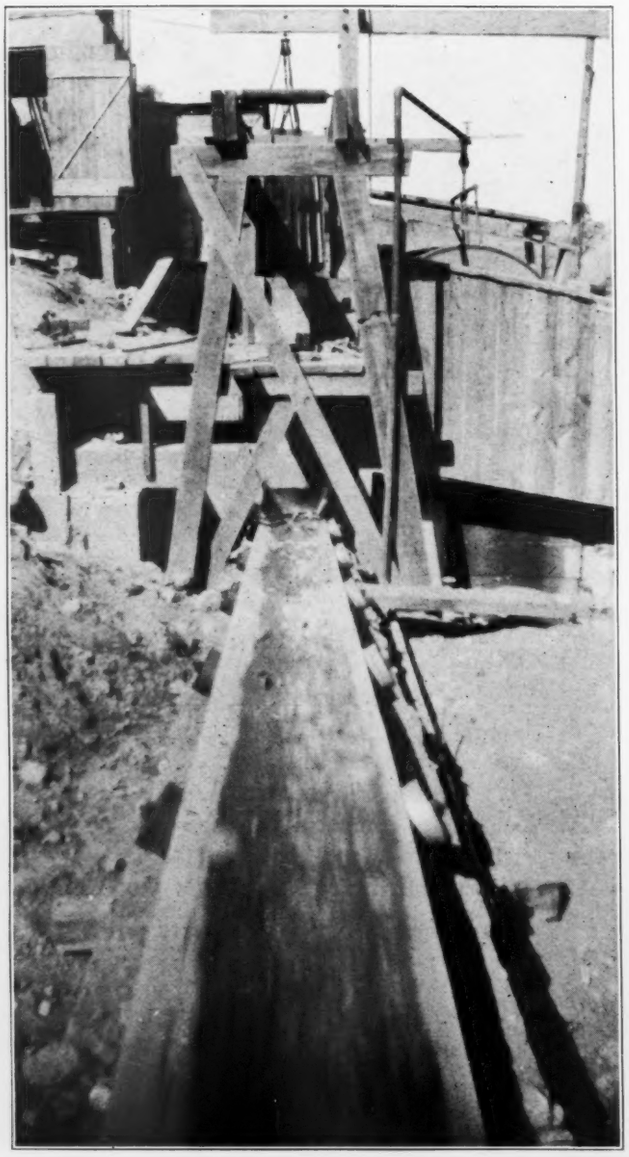
The hoist is a special scraper hoist, with an inhaul speed of 278 feet per minute and an outhaul speed of 625 feet per minute. It is operated by a 90-h.p. General Electric motor.

The feeders for the conveyors are of the reciprocating type, and were made at the plant.

A peculiar condition exists at the plant, due to a bank of clay across the river from the plant. When built, the plant was erected on one side of the Peckman river while the pit was located on the other side. Material was conveyed over the river by belt conveyor. After a depth of 20 feet was reached, clay was encountered, which necessitated the extension of the belt conveyor so as to get into better materials.

In the present pit, excavation has been carried down almost to the level of the river, without encountering clay. This necessitates elevating the material, and then dropping it to cross the river, and elevating it again to the screens. To accomplish this, there are four sections of 20-inch belt conveyor. The first section, from the field hopper, has 228-foot centers and runs at a speed of 346 feet per minute. This belt handles stone up to 9 inches and discharges onto a bar grizzly, which throws everything over 2½ inches into a 10-inch by 26-inch Farrell style B jaw crusher. The sand and small gravel that go through the grizzly drop onto a second conveyor of 148-foot centers. This conveyor runs at a speed of 372 feet per minute, and is at an incline of 7½ degrees. The first conveyor runs at an incline of 3 degrees. These two conveyors are driven by the same motor, a 15-h.p. Century.

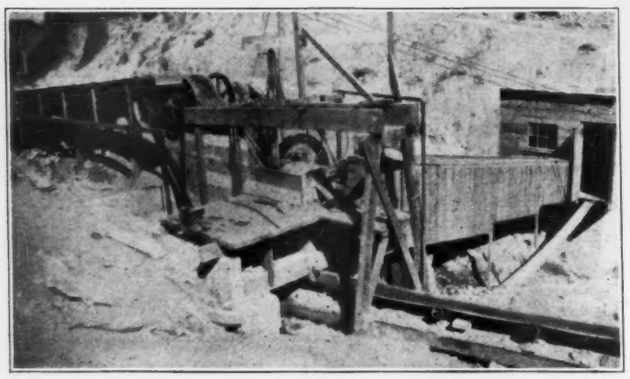
The second conveyor discharges into the old hopper, where the material is fed onto a third belt conveyor of 319-foot centers by a reciprocating



Conveyor from Crusher

feeder. All this material is 1½-inch gravel and sand, and under.

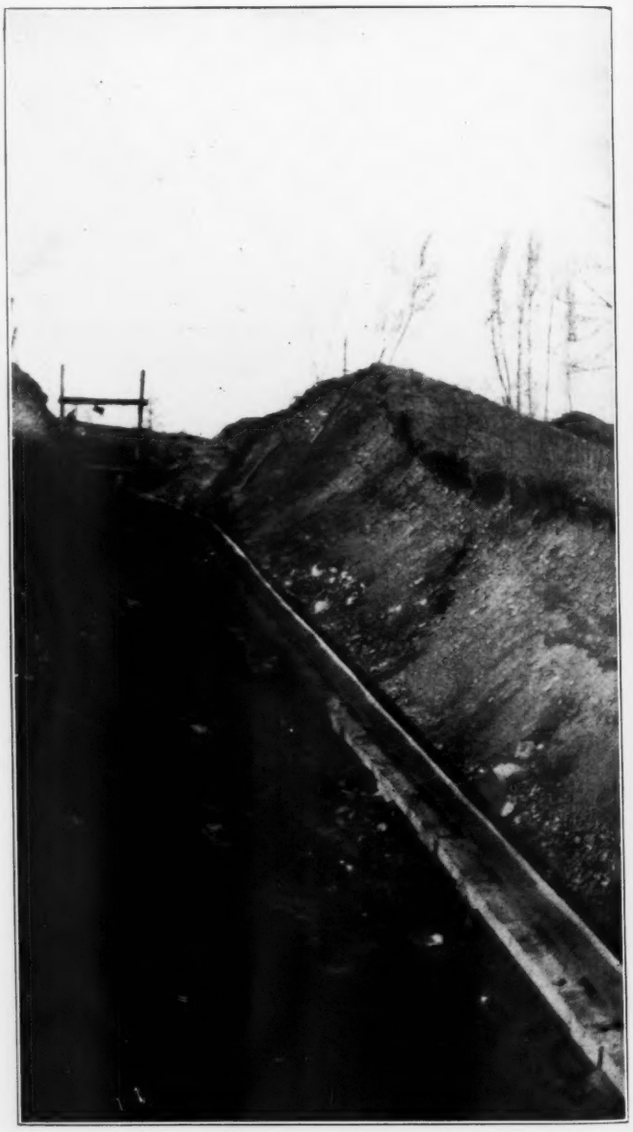
This third conveyor runs downhill at an angle of 4 degrees, at a speed of 360 feet per minute, and discharges onto a fourth conveyor, which crosses the river and elevates the material to the screens. This conveyor has 140-foot centers, runs 350 feet per minute up an incline of 21 degrees, and discharges into a set of revolving screens.



Grizzly Between First and Second Conveyors

Any gravel over 2-inch is run through a secondary crusher, a 13-inch by 24-inch Farrell style B jaw, where it is reduced to ¾-inch. The discharge of this crusher drops onto another 20-inch belt conveyor which carries the gravel back across the river and again discharges it onto the incline conveyor. This crusher conveyor has 115-foot centers and runs at 300 feet per minute.

All of the belting used on the conveyors and crusher drives is furnished by the Stanley Belting Corporation. All idlers are ball-bearing. All chains and sprockets are of manganese steel.



Third Conveyor in Cut Through Hill

The gravel drops from the screens to bins, from which it is loaded onto trucks and is either sent out for delivery or is put onto a stock-pile.

Sand is settled in two Allen settling tanks in series, the concrete sand spilling out on the left side of the mill, where it is picked up by a Brown-

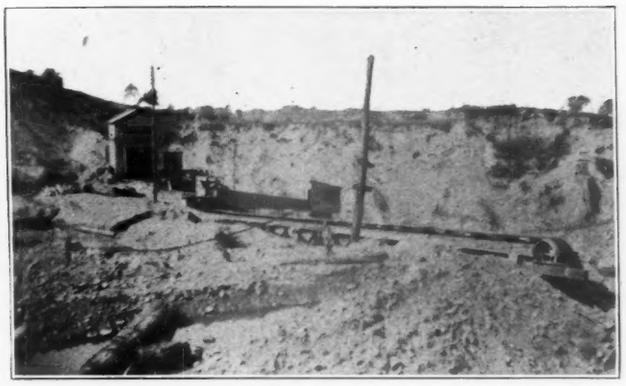
ing crane and deposited into a steel loading hopper with a capacity of 65 cubic yards. The surplus sand is stored on a stock pile.

This problem of settling the sand had proved difficult and as this same problem may confront hundreds of other operators, M. C. Pohlkotte, manager of this company has kindly supplied details as to how it was found possible to achieve dependable and uniform results. Two type 100 Allen settling tanks are placed in series, thereby making two products—a state specification concrete sand and a brick or plaster sand. A 6-foot tank receives

View from Field Hopper Showing Hoist House

all of the undersize feed from the bank of Link-Belt screens, above mentioned. This feed runs approximately 50 cubic yards per hour under peak load conditions, and is carried by 1,100 gallons of water through the tanks.

The overflow of the concrete sand tank passes into an 8-foot tank, where the brick or plaster sand is settled. The overflow of the 8-foot tank is waste



Second Conveyor Discharging Into Second Hopper

matter, consisting of dissolved clay, roots, leaves and grass.

Prior to this season, no stripping was done, and from two to three feet of clay, or approximately six per cent by volume, was removed from the feed material, leaving not more than one per cent in the sand. At times this clay content in the feed has run as high as eight per cent, with no change in the amount settled, due to the operation of the tanks.

Field Hopper and Scraper

The waste material in the overflow from the larger tank passes down a long flume to a settling basin where it is pumped back into the pit as above described.

Considerable difficulty was encountered in making a concrete sand that would pass the state specifications because of an excessive amount of

Third and Fourth Conveyors, and Crane Stocking Sand

Incline Conveyor and Crusher Conveyor

fines in the feed. An adjustable baffle, which has been set in a certain position, that was determined after a few analyses of the product, gives a remarkably uniform classification that has not varied more than four per cent during the entire season. A sample of the material fed to the tanks for settling and classification had the following analysis, figures in per cents:

Passing	Retained on		Concrete Sand	Plaster Sand	Waste
½ inch	¼ inch	2.0	3.2	0.0	0.0
¼ inch	10 mesh	4.0	16.2	0.0	0.0
10 mesh	30 mesh	18.1	36.1	3.0	0.0
30 mesh	50 mesh	19.2	26.1	18.1	0.0
50 mesh	100 mesh	30.5	14.1	56.6	6.0
100 mesh	200 mesh	16.2	3.0	17.3	40.0
200 mesh	.....	10.0	1.3	5.0	54.0

The finer or bituminous sand spills out on the right side of the mill, where it is loaded onto trucks by the crane or is transferred onto a stock pile.

Gravel is stocked near a loading hopper of the same size and design as the sand hopper, ¾-inch gravel being stocked on one side and 1½-inch on the other.

Water for washing the sand and gravel is pumped out of the river by two Worthington centrifugal pumps. The waste water runs into two settling basins, at the lower end of which is a third Worthington centrifugal pump. When the settling basin is filled with water, one of the pumps from the river is shut off, and the pump on the dam is started. To clean out the settled sand from the basins, a Morris 6-inch centrifugal dredging pump handles the fine silt back into some basins which have been built in the worked-out portion of the pit, where the silt is settled while the water runs back into the river.

Six men besides the superintendent are required to operate this plant.

Annual Conference Institute of Quarrying

The Annual Conference of The Institute of Quarrying will be held at Brighton, England, on June 25th, 26th and 27th. As will be noted, it will only last three days this year, and there will be no Exhibition in connection with it.

How Quarrying Cost Items Prove Useful

By Daniel J. Hauer

Elsewhere in this issue of Pit and Quarry is a brief report on the cost data that have been collected on questionnaires that were sent out early in 1928 by the U. S. Bureau of Mines to operators of more than 1,600 quarries. Replies have come in slowly.

No doubt some operators object to making public their costs, in the belief that it is not good business to give such information to their competitors; but it is evident that many other operators have no such hesitancy and are willing, for the good of the industry, to divulge their data.

The reports that have been received give evidence that a large number of operators keep some form of detailed costs, but it is evident also that these costs are not so analyzed nor segregated as to make them available for ready use. A cost-keeping system cannot be said to be perfect unless the costs are so detailed, summarized and anlyzed that they can be used daily, monthly, or for an entire season. Any system that needs days, weeks, or months to compile and analyze is not to be commended.

Cost-keeping of pit and quarry operators is needed for two purposes only. The first object is for deriving data from which to set selling prices, and this can be accomplished by bookkeeping or ordinary accounting.

The second use of cost-keeping is to secure suggestions for bettering management, and this is the really more important, because such improvement is a prime essential in reducing the cost of production and thereby enhancing profits.

It is an old but trite saying that nothing is too trivial to deserve notice. Real cost-keeping never overlooks the most minute detail; yet costs that are not analyzed nor summarized daily, weekly or monthly, and thereby rendered available for instant use, in detecting poor operation, wrong methods, expensive delays, or other wastes, infer that these things can be permitted to exist and be repeated.

If a mistake of yesterday is discovered and rectified today, then a leak is stopped and an additional profit may be expected.

With the proper kind of a cost-keeping system installed and kept up to date, only a few hours work will be involved in obtaining a summary of any costs for a season or for a year.

The writer feels that operators are to be congratulated upon the wonderful progress they have made in many lines, including cost keeping. A decade or two ago he knew from sad experience that few, if any operators kept costs or paid much attention to details of management.

Central Plant Prepares Ready-Mixed Concrete

Special Equipment Assures Continuous Output in All Seasons

The Ready-Mixed Concrete Company, of Pittsburgh, Pennsylvania, late last summer placed in operation a new central mixing plant which is the last word in efficiency of design and operation. Its location is only a short distance from the downtown section of Pittsburgh where a large amount of building construction is always in progress.

The company originated as the Ready Mix Concrete Company in 1925, operating a plant in another part of the city. On September 15th, 1928, the company was taken over by four of the largest sand and gravel companies in the Pittsburgh district. These are: J. K. Davison and Bros., the Iron City Sand and Gravel Company, the Keystone Sand and Supply Company, and the Rogers Sand Company. The original plant is still in operation and produces 650 cubic yards of concrete per 10-hour day when operating at full capacity.

The new plant is built of structural-steel framework covered with corrugated sheathing and roofing, and is very compact in design. This compactness is a great asset because of the high value of the land, due to its downtown location. All foundations and pits of any kind are of concrete, and bins and tanks, with a very few exceptions, are of steel.

Sand and gravel is delivered by truck from one of the plants of the operating companies and dumped into an underground concrete pit. Here an apron feeder delivers the material to a C. O. Bartlett and Snow vertical bucket elevator. This elevator is totally enclosed and discharges into a rubber-lined chute at the end of which is a swivel chute by means of which the various sizes of material are deposited into their respective bins. The storage bin is at the top of the plant and is of all-steel construction. It has a total capacity of 500 tons, and is divided into four sections, one for sand and three for the various sizes of gravel.

Cement is received in bulk by the carload on a side-track from the Pennsylvania Railroad, whose right-of-way bounds the plant on two sides. The cement is unloaded from the cars by a Stephens-Adamson power shovel into a steel bin feeding a four-inch Fuller-Kinyon pump, which conveys to the storage bins. The two cement storage bins are located next to the sand and gravel bins and have a combined capacity of 900 barrels of cement.

Sand and the desired size of gravel are discharged by gravity into two weighing hoppers. Cement drops from the bins to two screw conveyors, driven by 7½-h.p. Westinghouse motors, which discharge into a third weighing hopper. Each of these hoppers is connected to a Fairbanks springless scale, so placed that the operator can read them at a glance without leaving the hopper gate levers. Water is controlled by a patented Blaw-Knox meas-

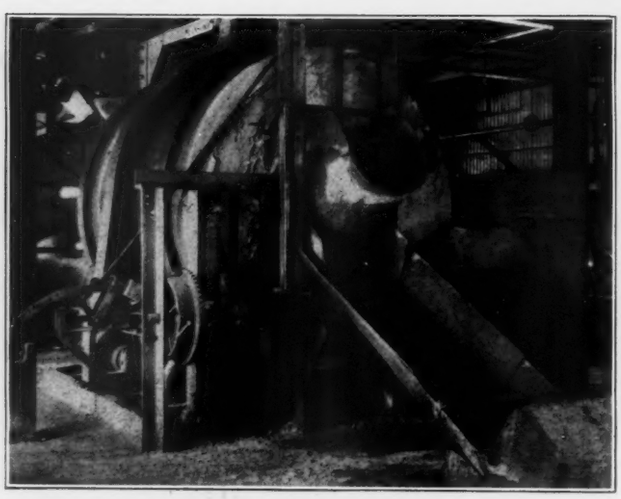
View of Office and Plant

View of Plant Showing Bucket Elevator

Air Compressor for Fuller-Kinyon Pumps

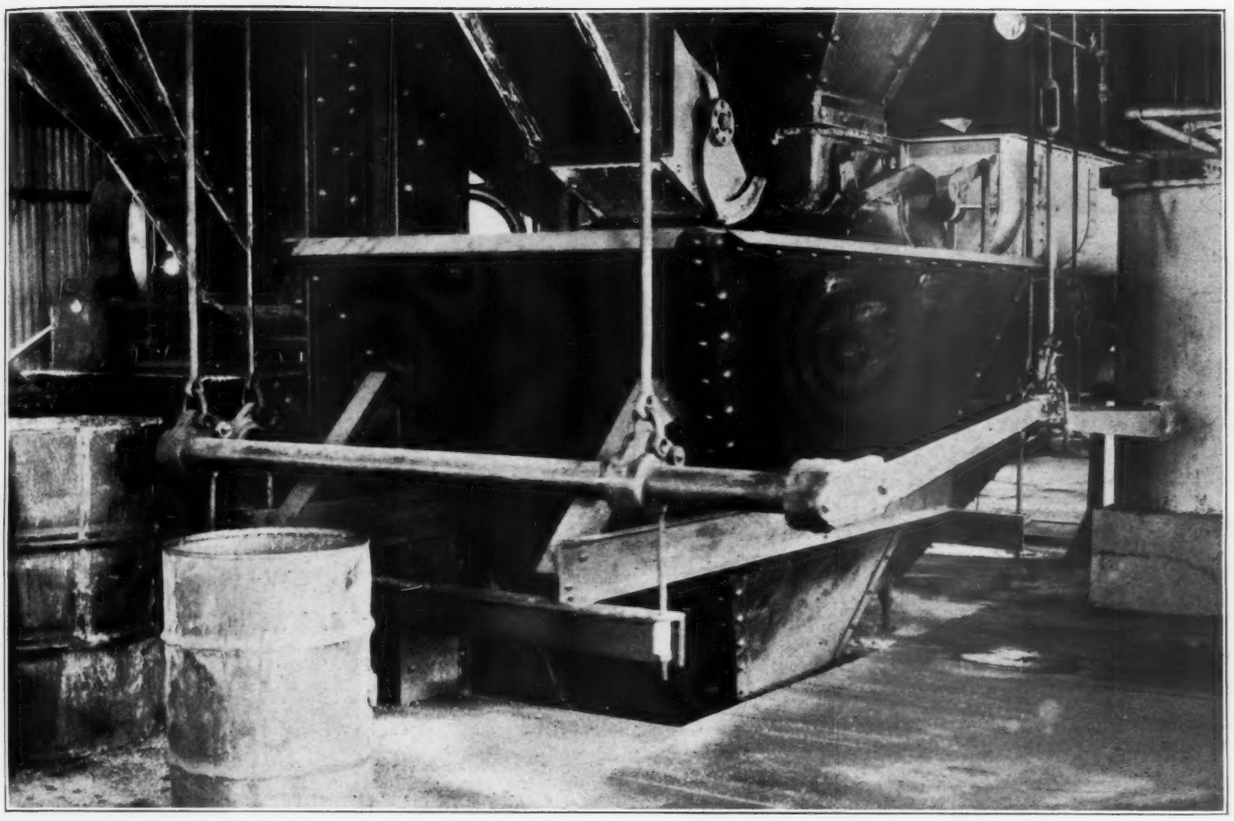
uring tank of 100-gal, capacity by means of which the exact amount of water desired can be added to the mix.

The materials discharge from the weighing batchers by gravity into the Ransome 3-cubic yard

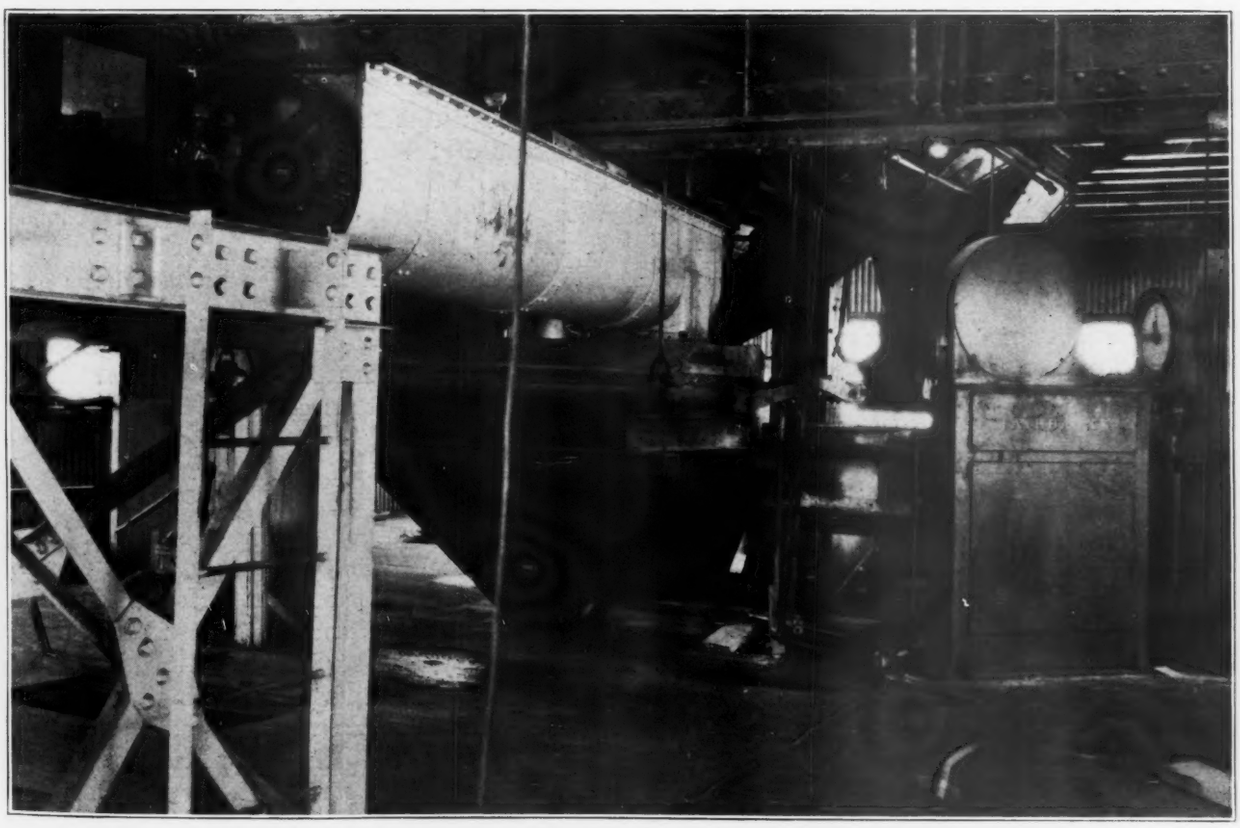


Three-Cubic Yard Ransome Mixer

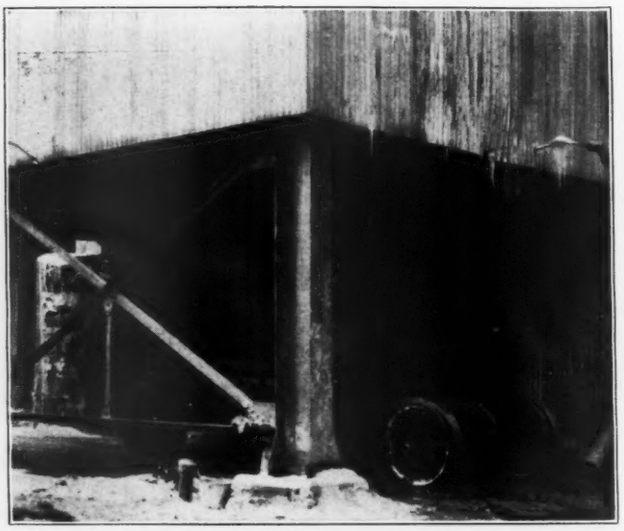
One of the 60-h.p. Boilers for Heating Concrete



A Weighing Hopper with Scales, Screw Conveyor and Water-Measuring Tank



A Cement Screw Conveyor with Weighing Hopper and Scale to Right



Truck Being Loaded, Under the Mixer

mixer which is direct gear driven by a 60-h.p. General Electric motor. The discharge chute from the mixer is so designed that when the load is released a portion of the chute is lifted by counterweights, preventing any spilling of concrete into the chute.

A telephone system was originally used to transmit orders from the office to the mixing floor, but this has been superseded by an electrical system which has effected a great saving of time and practically eliminated any possibility of error. The dispatcher in the office inserts plugs in different places on a board and this indicates immediately on a board on the mixing floor the exact amount in pounds of sand, gravel and cement, as well as the water-cement ratio desired for that particular mix.

The company operates a fleet of more than thirty trucks, most of which are Republics and Macks, with Bartlett and Snow, and Blaw-Knox bodies. A number of White and Mack trucks also are operated with Barrymore mixer bodies. All of these, however, are loaded at the Point plant of the Keystone Sand and Supply Company.

In the basement of the building are two Sullivan air compressors, each direct driven by a General Electric 25-h.p. motor, which furnish compressed air for the Fuller-Kinyon pumping system. Two 60-h.p. Erie City Iron Works boilers, with a working pressure of 125 pounds, furnish steam for winter heating of concrete. Each of these installations consists of two complete units so that if one should fail there would be no delay of operations. The boilers are fed by a Westco-Chippewa pump which is driven by a 3-h.p. Century motor.

When the plant is in full operation, the city water mains are unable to supply water fast enough, so three large wooden reserve tanks were installed at the top of the plant to supplement the regular supply and prevent expensive delays. Also, to avoid clogging the city sewers, three pits have been dug on the property, which serve as settling tanks for washout water from the mixer. This water runs out of these tanks into the sewers 98 per cent clear.

The plant is operated by a crew of only five men, in spite of its capacity of 650 cubic yards per day. Concrete is generally delivered in the winter at a temperature of from 82 to 86 degrees F. Actual tests have shown that only four or five points of temperature are lost in transit.

The entire plant was designed and built by the Pittsburgh Engineering and Construction Company which also built and installed all bins and hoppers as well as the three weighing hoppers. J. E. Burke, general manager of the Ready-Mixed Concrete Company is in active charge of operations. The other officers of the company are: Alex W. Dann, president P. K. Rogers, secretary; H. S. Davison, treasurer; and George Vang, vice president.

Building Superhighway at Washington

By E. E. Duffy*

The newest contribution to the growing exhibit of superhighways and parkways is the Mt. Vernon Memorial Highway, which properly belongs in the latter class, soon to be built between Washington and Mt. Vernon, Va.

Chief among the requisites of such a parkway in the modern sense, is an adequate right-of-way. The Memorial Highway will be placed on a strip of land 200 feet wide. At first, a 40-foot pavement will be constructed, with additional hard surfacing to be laid later when traffic demands it. The roadway will be more than 15 miles long.

Another modern note will be struck in the construction of seven or eight ornamental bridges. These are to be built to a width of 60 feet, which will preclude traffic jams and accidents common to narrow structures.

By means of fast moving machinery, the highway will be completed by 1932 in time to be dedicated at the celebration of the two hundredth anniversary of the birth of George Washington. Work of preparing the roadbed has already started.

Landscaping will progress along with the construction work, so that shortly the builders will have achieved their purpose of making the Memorial Highway one of the most beautiful in the world. Neat parking places will be provided between the highway and the Potomac river.

The Mt. Vernon Memorial Highway will be the result of fifty years of planning. Linking together Washington, Alexandria, Washington's "home town," and Mt. Vernon, it will serve as an admirable monument to the First President. Interest in this historic corner of Virginia has been increasing extensively each year, along with the growth in touring.

*From the Cement Association.

Material Service Launches Self-Unloading Motorship at Sturgeon Bay, Wisconsin

A new era in the history of inland water transportation was introduced recently when the new self-unloading motorship *Material Service,* was launched at Sturgeon Bay, Wis., on March 6. This boat, which is the first of its kind, will make its appearance in the Chicago river within the next few weeks when it will be placed in service by the Material Service Corporation for transporting sand and gravel from its new pits at Lockport, Ill., to its dockyards on the north branch of the Chicago river and on the Calumet river in the south.

This new motorship was designed especially for the needs of the Material Service Corporation and comprises many new innovations which make the craft distinctive in the field of water transportation. It was built to pass under all bridges and is the first self-unloading vessel for bulk materials to be used in canal transportation in and about Chicago.

"Material Service," the New Motorship of the Material Service Corporation.

Description of Motorship

Material Service is a twin screw, self-propelled, self unloading, and also self loading Diesel combination river and lake boat, particularly designed to go under low clearance bridges having a minimum height of 14 ft. 6 in. when the vessel is in ballast. She was built by the Leathem D. Smith Dock Co. for the Leathem Smith-Putnam Navigation Co. of Chicago, under a 10-year contract for the carrying of materials, sand and gravel, from the Lockport plant of the Material Service Co. of Chicago to its Chicago docks. The fixed bridges on the Chicago drainage canal as well as the increased restrictions on bridge openings on the Chicago river forced the low clearance design. The self unloading feature consisting of the Leathem D. Smith patented tunnel scraper system, consists of two 4-yard scrapers delivering to incline conveyor and 90-foot boom conveyor with jackknife A-frame, which lies down on the deck while the vessel is passing under the bridges.

The unloading system is driven through clutches from the forward end of the port by a Winton Diesel propelling engine. The annual tonnage of material required to be moved from Lockport to Chicago not being considered sufficient to keep the vessel busy, a 15 inch sand dredging pump was also installed, driven from the forward end of the starboard Diesel propelling engine to permit vessel to load lake sand pumped in Lake Michigan and delivered on the Chicago river docks. In connection with the same loading system, there is also used the patented dewatering boxes which remove the free water from the dredging pump and place the sand to the incline unloading conveyor for distribution over the length of the ship's cargo hold by removable tripper traveling on the boom conveyor and a stationery conveyor extending from the end of the boom the remaining length of the ship's deck.

Material Service will have a cargo carrying capacity of 2,500 tons on 13 foot draft when operating in the drainage canal. She will load 1,500 cubic yards of lake sand from her dredging boom to a loaded draft of 11 ft. 6 in. when pumping in Lake Michigan. Her deck will be constructed with longitudinal sliding steel hatch covers in accordance with modern Great Lakes practice. Twin screw, twin rudders and pilot house control of engines as well as steering will facilitate flexibility in navigating the tortuous Chicago river and close work under the Chicago river bridges. She will have a water ballast capacity in double bottoms under the tank top and side tanks of 800 tons which will be removed by a centrifugal pump during the loading operation and admitted by gravity during the discharging operation. Her design and construction involved many new features and difficulties, but it is believed that the need for vessels of this type to meet the similar difficult situations well justifies the work and expense involved. We believe her successful operation will result in a large development of self unloading vssels for the canals and inland waterways where shallow draft and low headroom difficulties must be overcome.

The officers of the Leathem Smith-Putnam Navigation Co. are Leathem D. Smith, president, T. J. Ryan, vice president and general manager, Rufus W. Putnam, secretary and treasurer.

This new motorship service will introduce to the sand and gravel industry the newest and most economical methods of handling bulk materials from pit or quarry to consumer.

At the new Lockport sand and gravel plant of the Material Service Corporation material will be moved at the rate of 500 tons per hour via a tunnel system over a 42 inch belt by gravity to the new motorship, which in turn is to transport the material to the docks of the Material Service Corporation in Chicago without the necessity of raising a single bridge.

At the unloading docks which have been newly equipped with the most modern improvements, the material will be transported from the boat to the trucks without the aid of labor, cranes or shovels. It will be practically an automatic process originated and designed by Material Service Corporation in which gravity is the propelling power.

The new self-unloading equipment of the motorship will convey the material to huge stock piles upon the dock, which has been constructed to handle the cargo without the use of machinery or manual labor. Under the concrete foundation of the dock special tunnels have been built which will be directly underneath the large stock piles placed on the dock by the motorship. Chutes at the tops of these tunnels will permit the material to flow by gravity from the stock piles into the trucks below.

This improved method of handling the material from the boat to the trucks will greatly speed up the process of truck loading as well as reducing the cost of handling the material from the boats into the trucks. It is in keeping with the business policy of the Material Service Corporation in constantly striving for better and more efficient methods of handling materials vital to the building industry. In this the energetic and progressive executives of the Material Service Corporation have proven themselves to be pioneers of unusual initiative. (*Continued on Page* 76)

Christening the Motor Ship "Material Service."
Front row: Capt. Holt, S. B. Greiver, Tom Ryan, Irving Crown, Leathem D. Smith. Back row: Mrs. McCormick, Mrs. R. W. Putnam, Senator John Dailey, Major R. W. Putnam.
Christening the Boat—Mrs. Leathem D. Smith, and Mrs. Irving Crown.

Portland, Maine, Has a City Owned and Operated Crushed Stone Plant

By F. A. WESTBROOK

THE City of Portland, Maine, has engaged in the unusual procedure of producing its own crushed stone for the construction and repair of its streets and highways. The reason for this is that there are no private producers of crushed stone in the vicinity of Portland who can be depended upon for a supply. Formerly this material was brought from Massachusetts plants but the cost of doing this is high and when, in 1919 and 1920, the railroads were so congested that freight deliveries became uncertain the present property was purchased and the plant installed. As Edward M. Hunt, commissioner of public works and city engineer of Portland, says, the city would not attempt to operate its own plant if it could buy crushed stone economically in the neighborhood and be sure of a constant supply.

The stone is a variety of granite which, when crushed, yields a material of sufficient angularity and hardness for the bituminous macadam construction employed. It is also used in the concrete foundation for granite blocks. Of course gravel from nearby producers could be used for the concrete work but so long as the quarry has to be run anyway, a part of its output is consumed for this also.

From the standpoint of mechanical equipment, this operation is well organized and it has been possible to obtain some interesting figures showing the results obtained in the various departments. For instance, in the blacksmith shop, where an

Loading from Stock Pile

Breast of Quarry Showing Irregular Stratification

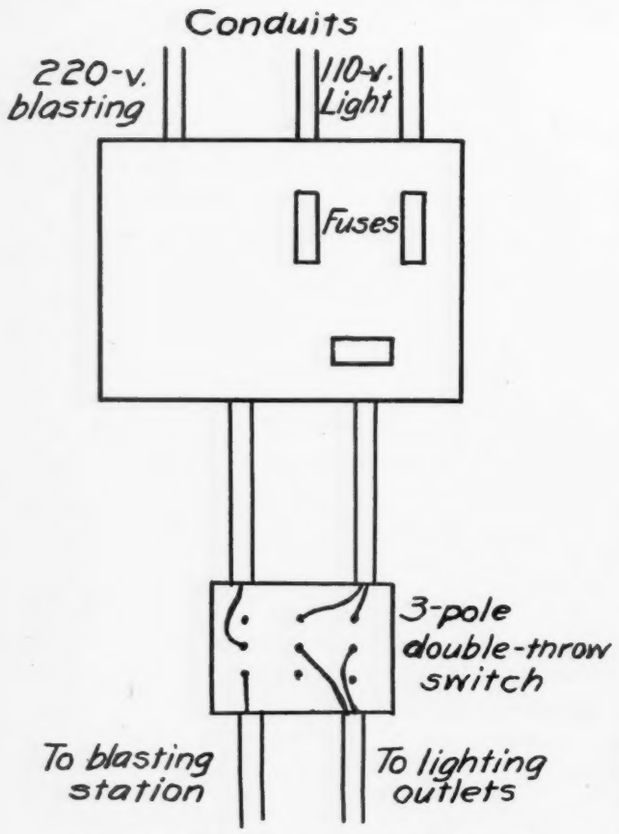
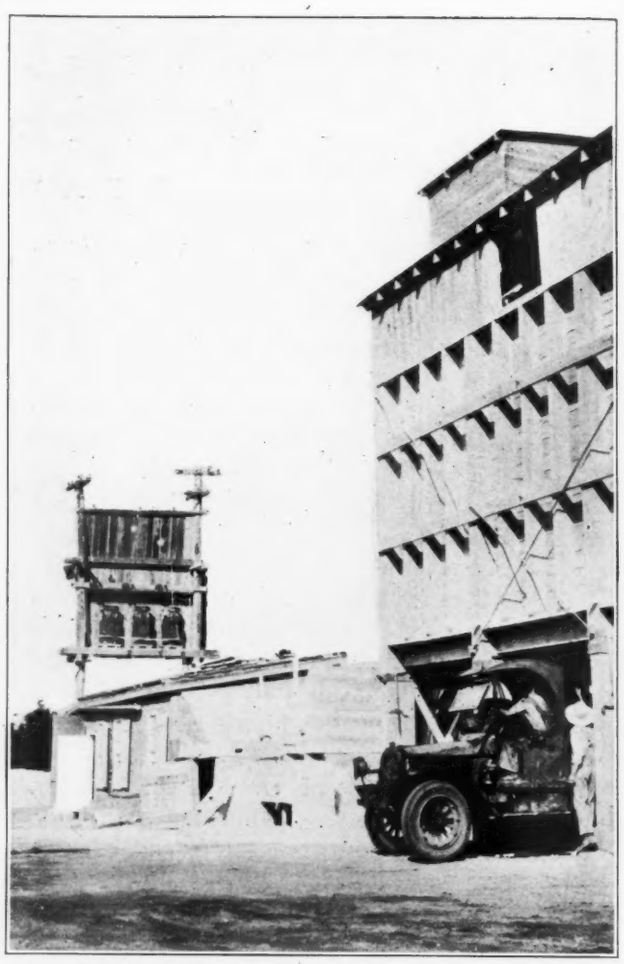


Diagram of Lighting and Blasting Circuits



Transformer Station, Compressor House, and Bins

Ingersoll-Rand drill sharpener has been installed, the blacksmith, John Amaroso, says that he can sharpen a drill in 20 seconds without hurrying. This is not mere hearsay for he demonstrated what he could do and the writer timed him. These are the large drills used with the E-24 and E-44 machines used in preparing for the big blasts. He makes jackhammer drills, including the bit and shank at the rate of thirty per hour and sharpens them at the rate of seventy-five per hour. In general, the blacksmith said, he could, with the help of the drill sharpener, do in one hour what it would take him a day to accomplish by hand.

There are two E-24 and E-44 Ingersoll-Rand tripod drills used for the main drilling and three Ingersoll-Rand jackhammers for secondary drill-

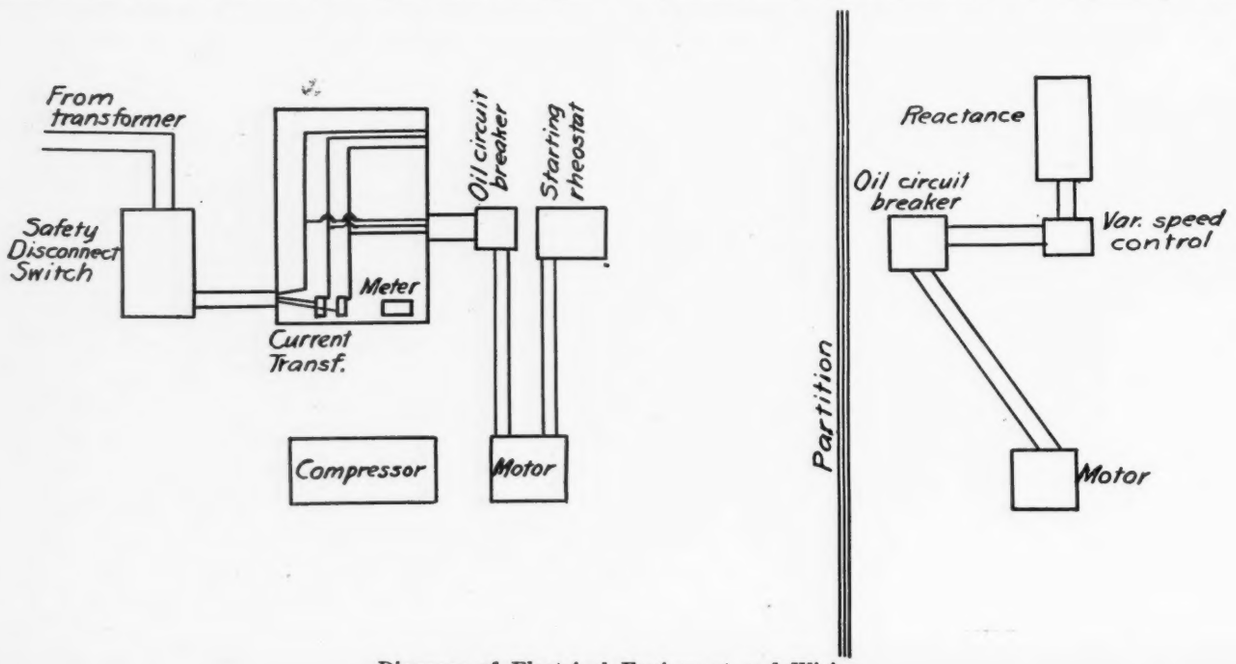
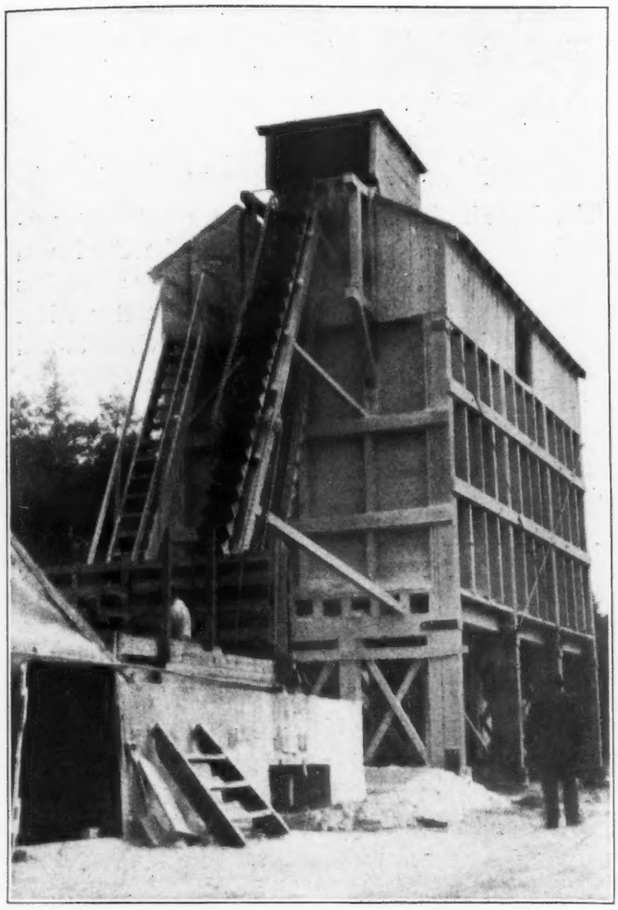


Diagram of Electrical Equipment and Wiring



Elevator from Crusher to Revolving Screen

ing. Sixty- and 75-per cent Du Pont dynamite is used for blasting. Stone is loaded at the breast of the quarry by hand into horse-drawn wagons which carry it to the crusher. The latter is a New England Road Machinery Company jaw crusher. From this the stone is taken by an elevator to the revolving sizing screen. Both of these pieces of equipment are of New England Road Machinery Company make.

Four sizes of stone are produced, called, respectively, egg stone, nut stone, pea stone and dust. These are dropped into bins and the tailings from the screen pass through a chute back to the crusher.

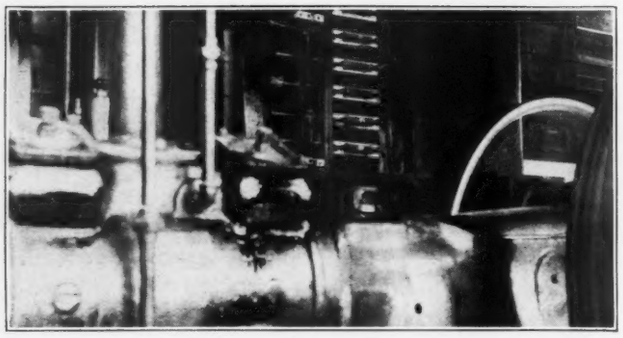
There are also outside stock piles from which trucks are loaded by a Barber-Greene loader. This machine, the foreman told with much pride, can load a 4-ton truck in three minutes.

Another very useful labor saver employed in conjunction with the product of the quarry is a portable Le Roi gasoline-engine-driven tar and concrete mixer. This is light enough to be pulled around from job to job, even by a horse-drawn truck, and it mixes 20 tons of material per day.

Perhaps the most interesting thing about this operation is in the building housing the 12-inch by 10-inch Class ER-1 Ingersoll-Rand compressor and the motors which drive it and the crusher, elevator and screen. First, let it be said that neatness and cleanliness prevail. Next, that it is divided into two sections—one for the compressor and its motor, and another for the motor which drives the crusher, elevator and screen. The belt drive from the latter passes through an opening in a partition to the driving shaft. This, of course, excludes a great deal of the dust arising from the crusher and elevator but, as a certain amount is bound to gain entrance through the opening for the belt, the motor is kept in a room by itself. The compressor room directly adjoins this.

A very good job has been done here in the installation of the wiring, switches, circuit breakers and motors. A rather detailed description of this is given here as it may well be taken as a model for other similar jobs. The motor and the compressor which it drives have been securely and conveniently placed on the same raised concrete base. The floor is also concrete. Current is supplied by the Cumberland Light and Power Company from a bank of transformers on poles located just outside the building. Power wires are brought into the compressor room from the poles and enter a Columbia safety disconnect switch through iron conduit. From this, through conduit, the wires enter a metal distributive cabinet mounted on the wall in the bottom of which are a current transformer and a

George Deollo and Tripod Drill



View in Compressor Room

meter. Two circuits are taken out from this box—one to the motor which drives the compressor, and the other passing through the partition to the motor driving the crushing and screening plants. Both circuits are in iron conduit on the walls. In fact there is no exposed wiring.

Let us consider the compressor motor. The power circuit first enters a General Electric oil circuit breaker to guard against overloads or short circuits. From this the wires extend down the wall and under the concrete floor to the motor, all in conduit. The starting switch is mounted on the wall alongside the oil circuit breaker and the wires from this to the motor have also been placed in conduit on the wall and under the floor.

The wiring of the motor for the stone plant is very similar except that here a manual speed control has called for a General Electric variable-speed controller and reactance, making a slight difference in the arrangement of conduits, as shown in the diagram.

Both motors are 60-h.p., 440-volt, General Electric slip-ring induction motors. Compressed air has been piped to convenient locations in both rooms so that, with the aid of a hose, it is a simple matter to blow dust out of the motors. This is done at least once a day with the stone plant motor, sometimes at more frequent intervals with the compressor motor.

There is one other detail of the electrical installation which has not been mentioned and which is not common. This consists of a fuse-box and switch on the wall of the compressor room where the lighting and blasting circuits are controlled. The fuse-box is a metal cabinet into which three iron conduits enter at the top for wires direct from the outside transformers. Two of the conduits contain 110-volt wires for lighting. They pass through fuses and are connected with a meter in the bottom of the cabinet and then pass out at the bottom through a single conduit to a double-throw three-pole Trumbull switch. The third conduit at the top of the conduit carries the 220-volt circuit used for blasting. This passes through a fuse and out at the bottom through conduit to the Trumbull switch. When the switch handle is in the upper position the lights throughout the plant are on, when in the lower position the blasting station is connected, while in the neutral position both are dead. Details are shown in the diagram.

More About Aquagel

The March 13 issue of PIT AND QUARRY contained an article about the plant of the California Talc Company and described the new use that has been found for bentonite. A commercial product is prepared by mixing this mineral with baryta and other non-metallic minerals. This preparation, known in the trade as Aquagel, is used instead of ordinary mud by drillers of oil wells when gas pressures are encountered.

The patents on this novel material are held by the Silica Products Company of Kansas City, Missouri, while the California Talc Company holds the license for its manufacture.

Gain of Simplified Practice in Industry Reported

The Commercial Standards Group announces that 24 simplified practice recommendations were audited during the calendar year 1928 to ascertain the average degree of support. The manufacture of commodities covered by these 24 programs was reported 87.03 per cent in conformity with the respective programs. The survey covered 12 recommendations in the building and construction materials field, with an average degree of support of 87.45 per cent; 7 in the hardware and mill supplies field, with an average adherence of 80.17 per cent; two for plumbing supplies at 98.83 per cent; and three in miscellaneous fields at 91.88 per cent.

New Railways to Be Undertaken in New Zealand

Consul General W. L. Lowrie, Wellington, New Zealand, reports that the Public Works Department, has been instructed to expedite the construction of the Taranaki-Auckland railway, the Gisborne-Napier railway, the Inaugahua-Westport railway, and the Midland railway to Nelson. Instructions have also been given that a survey be made of the South Island Trunk railway.

We Regret

In the March 13 issue of PIT AND QUARRY an error occurred whereby the flowsheets on pages 74 and 88 were transposed. The first flowsheet belonged with the article upon the Boulevard plant of the Union Rock Company, while the second should have accompanied the article upon the plant of the Sunset Rock Company.

Rock Drilling in Quarries

By J. A. THORNE*

GENERALLY speaking, the fact that county authorities in Scotland have done a great deal of their own quarrying, involving the use of a number of small quarries scattered in various parts of respective counties, some counties having as many as forty or fifty small quarries serving local stretches of road, has to some extent prevented the development of any considerable number of large, privately owned quarries with big outputs.

Methods of transport have, however, in recent years changed and improved, and this has had quite an important bearing on the quarry industry. Many of the county councils have themselves abandoned their small quarries and centralized on certain quarries which are developed with a modern plant to deal with the road metal requirement over considerable areas, and at the same time the privately owned quarry has been able to expand its business, because it has been able to distribute its output over a wide area.

The history of rock drilling in Scotland really dates from the introduction of what is known as the piston drill, the first machine of this type having been introduced here about thirty years ago. The piston rock drill as used in quarry work, as all quarry operators know, is a drill having a cylinder from 2½ to 3½ inches in diameter, and stroke of varying length up to 5 inches. It gets its name from the fact that a heavy reciprocating piston is used, the piston rod and chuck piece forming an extension of the piston itself, the whole of this metal forming a heavy moving mass, enabling the machine to give a powerful, if somewhat slow, reciprocating blow.

The steel used with this drill was invariably solid steel, sometimes round, sometimes octagonal, and sometimes of cruciform section. In a great many cases the bits forged on to the end of these steels were of what is known as the parallel wing type; that is, a cruciform shaped bit which might be anything from 6 to 8 inches long, the wings of which were parallel for their whole length except at the cutting edge, where they would be upset very slightly to give clearance for the rock cuttings.

This bit was originally introduced because it was found that in some rocks, particularly those where the formation was broken, the soft "backs" were encountered, the slow slugging action of the piston drill did not enable the short tapered bit to readily free itself from small cuttings or soft material which might fall in behind it in the drill hole.

Another reason for the use of this type of bit was that it was comparatively simple for the country blacksmith to re-fettle, as he simply dressed the cutting edges and continued this process until there was eventually practically nothing left of the long wing bit, at which stage either new complete steels or new bits heads were secured and welded on to the old drill rods.

In the early days practically all the piston drills in use in Scotland were steam operated, because it was necessary to transport the rock drill plant to numerous small quarries, putting down a few holes in each place and moving on to the next location; and as the portable air compressor, as it exists today, was unknown, it was certainly handier to supply steam either from the road roller boiler, or from the portable engine which would go along with the plant to operate the portable stone breaker.

The results obtained by this method necessarily compared very unfavorably both in boring speed and cost, as compared with modern methods, even allowing for the fact that twenty or thirty years ago the costs of labor, transportation, and coal were very much lower than they are today. Under present conditions, with the high cost of fuel and labor, such a method of operation is hopelessly inefficient, and can only be excused under some very exceptional condition such as exists in extremely rare cases.

The private quarry owner was not, of course, compelled to move his plant from place to place, as the county councils were, and although for a considerable time many private owners operated drills with steam power, it was gradually discovered that by operating these same piston drills with compressed air, the boring speed was increased anything from 30 to 100 per cent, and so the quarry owner began to introduce air compressors into his plant.

These at first were operated very largely from portable engines, or were of the type having an air cylinder direct-connected to the steam cylinder in the one frame, and operated by a small boiler. Later on electric power became available in a great number of cases, and the air plant was increased and modernized. In still later periods a very noticeable improvement in the design and construction of the heavy cold starting oil engine has induced owners to install this form of power, and abandon the use of steam entirely.

The next stage in the development of the rock drill for quarry work was the introduction of the small automatic rotation hammer drill, which is commonly known as the jackhammer, although the

* Abstract of a paper Presented before the South of Scotland Branch of the Institute of Quarrying, at Glasgow, Scotland.

term "Jackhammer" was originally the registered trade name of one manufacturer.

This machine, which is designed primarily for operation by compressed air, is used in some cases by quarry owners having piston drills, to supplement the work done by the larger machine for breaking up large boulders principally, but in some cases in small quarries where the output is not very great, and relatively short and small holes would give the required output, the steam jackhammer came to be used almost entirely in place of the piston drill.

While it is true that where small outputs only have to be considered, the jackhammer, as a steam operated machine, was able to do as much work as the piston drill, its real place in the scheme of things was, of course, as a supplementary to the larger tool.

About seven or eight years ago, a complete change in the practice of rock drill application to quarry work began to be noticeable, and a machine known as a heavy drifter was introduced into the quarry field. Drifters of one type or another had been commonly used in metal mining and in tunnel work for a considerable period prior to this development, hence the term "drifter."

Their construction had mainly been limited to machines of relatively small piston area and capable of boring holes of from 6 to 10 feet in depth at relatively high speeds, such as called for in mining and tunnel practice.

The old piston drill had, of course, been used for this work in the earlier days, and the enormous improvement in efficiency induced drill manufacturers to consider the development of the drifter for use in quarry work, so that quarry operators also might have the advantage of such a tool; consequently a drifter of particularly powerful and robust type, having a piston area of 4 inches in diameter, was developed, and the writer believes he is correct in saying that he introduced the first machine of this type which was used in Scotland some years ago, where it proved to be an immediate and astonishing success, this particular quarry having operated for some years with a piston drill, originally steam operated, and sebsequently air operated, and under such difficult conditions that the progress made was relatively poor.

The drifter machine, as it is now known, is built by several manufacturers, most of whom have two or three sizes, each having its own particular application. The largest and most powerful are able to put down holes to a depth of 35 feet quite easily, but more commonly they are used in this country for boring up to 20 feet, and in one or two isolated cases, from 25 to 30 feet.

Such depths of hole, of course, were quite impossible with the old piston drill, and the speed with which such holes can now be put down in a quarry has entirely revolutionized quarry practice where drifters have been put into use.

Mechanically, the construction of a drifter drill is a development in many respects of the jackhammer, in that it is definitely a hammer drill; that is to say, the piston which is of heavy construction, travels freely within the cylinder and strikes powerful and rapidly repeated blows on to the end of the drill steel shank, this in turn being held in place in a chuck which is within the frontend of the drill itself, and independent of the piston.

The rotation of the steel is in most cases by the rifle bar and ratchet method. This rifle bar is almost identical in appearance with that used in the old piston drill, and passes through a brass nut in the hollowed out back-end of the drill piston, causing it to turn through a small arc at each reciprocating stroke of the piston. The piston itself has parallel flutes, which in turn pass through a chuck nut at the front end of the cylinder, causing the chuck itself to be revolved. By this means positive rotation at just the right speed is given to the drill steel.

With the old piston drill, using solid steel, it was common practice to pour a little water into the drill hole so as to provide sludging. With the drifter machine, hollow steel is used, and a certain amount of live air passes down through the piston and through the drill steel to the cutting edge of the drill bit, so that in the majority of circumstances the cutting face is kept clear by this air blast.

There are some conditions, particularly in ground which is naturally damp and sludgy, where the addition of water is of great help, and in such cases the drill is fitted with a special type of blackhead, which enables water from a tank, which is kept under pressure, or from a pipe line, where the natural head is sufficient, to be passed through the piston and drill steel along with the air, and this serves to provide such sludging as may be necessary.

The success of the drifter drill in quarry work is due not only to the power which is behind the piston, but more especially to the fact that the drill bit itself is always up on the rock, and is being subjected to a tremendous number of powerful blows, tending always to drive it forward, whereas with the old piston drill a good deal of power was wasted in dragging a heavy piston and drill steel back and forth in the hole to no purpose so far as drilling progress was concerned.

There is not so much tendency usually for the drill bit on a drifter drill to jam, owing to its becoming bodyfast, because it has not the tendency to lose its gauge to the same extent as the piston drill bit did, on account of its reciprocating motion.

In the drifter the wear is mainly on the cutting edge, where it should be. For this reason it is not

necessary to allow such big clearances between the size of bit on each run of steel as was formerly necessary. With the piston drill, it was the general practice to reduce the diameter of each following steel by at least one-eighth of an inch, and, in abrasive ground, clearances up to one-quarter of an inch have been used, with the result that to get a reasonable size hole at a bottom depth of say 20 feet, it was necessary to start with an extraordinarily large diameter bit; consequently a heavy taper on the hole itself was produced, with the result that either sufficient explosive could not be got to the bottom of the hole where its efforts was most needed, or it was necessary to chamber the bottom of the hole. This latter practice, while being a necessary evil in many cases, was a waste both of time and explosive, and gave rise to not a few accidents, due to further charges being placed in the chamber before it had time to cool down.

With properly forged bits on a drifter drill it is not usual, except under exceptional conditions, to allow a clearance of more than one-sixteenth of an inch to each 2 feet run of steel. Under some exceptional conditions, or where the blacksmith is unable to make bits accurately, a one-eighth clearance is used.

I am acquainted with certain conditions where it is possible to drill 30 foot holes in hard whinstone where the difference between the starting and finishing diameter of the hole is only half an inch. This is near to the ideal. The perfect hole, of course, would be one which was larger at the bottom than at the top, but to obtain such would, of course, call for some miraculous act, which is not likely to be performed.

So much of the success of the modern type of drill depends on correct formation of the drill bits themselves, and I offer no excuse for quoting the following remarks on this subject which have been written by an authority who has made an intensive study of the subject, supported by information collected by rock drill experts all over the globe:

"No matter how efficient the compressing plant, the mining method, and the rock drills, or how careful the operator, if the bit is dull or of incorrect shape, the rock is not cut, expensive energy is wasted, and money and time are lost. . In the design of a good bit, the cutting and staying qualities should be considered as well as the ease and rapidity with which it can be made in the blacksmith's shop. The most important of these, of course, is the rapid cutting quality because the object in view is to cut the maximum rock in the minimum time. The importance of the staying quality is determined by the labor of the sharpening and the cost of transportation and handling.

"What Constitutes a Good Bit.—The consensus of opinion is that under average conditions a good bit for power drilling work should empody the following points:

"(1) It must take full advantage of the shipping and fracturing of the rock. In a bore hole there is a certain depth to which rock will fracture when struck by a sharp tool. If the tool is driven deeper than this it will not fracture the rock, but crush it. If the cutting edge of the bit is blunt it will not get full advantage of the fracture, and much of the force will be expended in crushing or pulverizing. The bit should act as a wedge.

"(2) The wings of the bit should be as thin as is consistent with standing up quality to allow for the ejection of the cuttings. If the wings are left heavy there is little space for the escape of cuttings, and consequently they are held in front of the bit and continually churned and ground, which means that the bit does not easily reach solid rock, and that each blow loses a large proportion of its cutting power before it reaches the rock.

"(3) The bit must be perfectly free in the hole at all times, because of the tendency of the rock to fracture, the drill hole will be a trifle larger than the cutting edge. If the bit is so designed that the cutting edge has the same diameter as the distance across the diametrically opposite corners and remains this diameter until dull, it will always remain free in the hole.

"(4) The bit must allow equal wear on all corners. If the bit is not symmetrical—that is, if the ends of all cutting adges are not the same distance from the center of the bit—the longest end will cut a groove on the side of the bore hole and a rifled hole will result. Furthermore, the wear is unequal, and the extra strains in the steel often break it. The rotation of the drill is impeded, and the parts of the machine subjected to excessive wear.

"(5) The bit must be dressed in a manner consistent with the treatment of good steel. It must not be overheated, or worked while too hot. Light, rapid blows should be used in forging. The bit must be tempered properly. The proper temper should be determined by experiment and rigidity adhered to. The bit should be allowed to cool thoroughly after forging, and should then be re-heated for tempering. It should never be sharpened and tempered on the same heat."

Drill Sharpener a Necessity

Where possible a drill sharpening machine should be considered an essential part of any modern quarry plant, as there is no doubt that however well bits may be made by the blacksmith, they cannot possibly be so well formed as they are in a good drill sharpening machine, and it is a well known fact that machine-sharpened bits, on account of their correct shape and gage, increase the boring speed anything from 30 to 50 per cent over that obtained by the usual hand sharpening methods.

It may appear to some that I have over-stressed this point of good drill bits; but I can assure my hearers that close attention to this detail will make a vast difference in their drilling speed, and indeed it can affect very materially the whole efficiency of the quarry plant.

A coal owner does not usually install valuable pithead gear, pumping machinery, washers, and other surface equipment unless he is satisfied that he can get an ample output of coal at a reasonable cost; but it is not unknown for quarry owners to

expend large sums of money on motive power, air plant, elaborate crushing, screening, and other equipment of a similar character, all of which must be constantly fed with stone from the quarry to maintain an efficient output, and, nevertheless, neglect the rock drill, and particularly the rock drill steel portion of their equipment, so that the flow of metal from the quarry to the crusher, and consequently the market, is erratic.

On the efficiency of the rock drill and the accessories used with it, depends the efficiency of the entire quarry plant, and this subject deserves the closest possible attention at all times.

I have not in this paper attempted to deal with what are known as well drills. These are mounted machines somewhat similar in principle to those used by oil well drillers, and capable of putting down holes to a very great depth and of large diameter.

There are one of two cases in England and Wales where such a machine is used with advantage, and in America it is used to quite a considerable extent, particularly in limestone quarries, or quarries where a long high face and solid ground is available. I do not know of any quarry in Scotland where the required conditions for this class of drill exist at the present time, and in any case they are only necessary where large outputs are considered.

The small jackhammer drill which is used for pop holing is so well known to quarry owners and contractors that lengthy remarks with regard to it are almost superfluous. It has a place in every quarry where pop holing of any description has to take place. The plaster shot method is still used in a few cases, but this is both wasteful and unsatisfactory in many ways.

In many small quarries where the output does not call for the use of the more powerful drifter, some of the heavier jackhammer drills can be used with great advantage. Some of them are quite capable of putting down holes of 20 feet or even greater depth, and for the county authority who by force of circumstances still has to operate a number of small quarries, the jackhammer drill is in most cases, and will eventually entirely supersede the piston drill, particularly as small light and highly efficient portable air compressors, which can be readily transported from one place to another, are now available.

In passing, I would say that the remarks with regard to drill steels which were made earlier in this paper, apply with equal force to the steels which are used with jackhammer drills. The shanks used with jackhammer steels are usually of a different type to those used with the drifters, and care must be taken to see that these shanks are of the right diameter and proper length, otherwise effective work cannot be expected.

I would conclude the remarks with a few recommendations:

Do not run your rock drills until they fall to pieces for lack of a little attention.

See that your rotation parts are in good order.

Particularly see that the sleeves or chucks which rotate the steel are in good condition. If they are not, the drill steels will be working out of line, and you will either break steel, or what is more serious, break pistons.

Do not under any circumstances allow your blacksmith to temper drill steel shanks in water. Proper quenching oil can be obtained for this purpose, and should be used, otherwise serious damage to the rock drill piston is bound to result.

See that your rock drill gets proper lubrication. Do not fill it up with oil which is too thin or too thick and especially do not use reclaimed oil which has served a long and useful purpose in some other machinery.

Due to the fact that the rock drill is necessarily built with very fine clearances, and that air and, in many cases, water is passing through at high velocity, it is necessary to provide a lubricant which, while being light in body, has the character of being able to stay on the parts needing lubricant.

If you use wet drills, do not allow your operator to leave the water valve open when the air throttle is closed, otherwise the lubricant will be washed out of the machine in a few minutes.

Do not use home-made spare parts on rock drills. The rock drill maker knows the right material and the right heat treatment required for every particular stress, and the failure of home-made parts usually results in destruction to other and more expensive portions of the machine.

Do not allow your machine to operate in a dirty condition. If you have to use, for any reason, a blow pipe, cover the front of the rock drill up with a sack so that chips are not blown into the machine.

See that the hose lines are blown out on every occasion before coupling to the drill.

Do not allow water to accumulate in the rock drill line, or have leaky joints or cocks about the quarry. A few air leaks will absorb as much power as is required to operate the drill itself.

Pardon my stressing these points as you are probably well aware of the necessity of their being taken care of, but in the course of one's travels it is not uncommon to see many conditions which should not exist, and as neglect of any one of the points represents a definite loss in hard cash, they are well worth going after.

As I have stated already, steam as a motive power for driving rock drills directly has fallen into disuse for obviously good reasons, and compressed air has taken its place almost entirely.

Some quarries which have been operating in the past with piston drills, air operated, have been alarmed to find that the air requirement for the modern drifter drill is a great deal more than that required for the old piston drill. When I say more air is required, that is a perfectly true statement, when measured in volume of free air per minute; but if it is considered in volume of compressed air, measured per foot of hole drilled, than the newer type of drill takes actually far less air.

A 3¼-inch piston drill such as commonly used in quarries requires approximately 130 cubic feet of air for its operation, but a drifter drill of the

(*Continued on Page* 63)

The Herzog Lime and Stone Company's Plant Comprises Two Independent Units

By J. J. SCHEDEL

THE most stringent requirements of a modern stone plant are easy accessibility to all machinery and ample headroom for possible further developments. These points were primarily considered in designing the new crushing and screening plant for the Herzog Lime and Stone Company, of Forest, Ohio. The plant itself is located at McVitty's, Ohio, on the Big Four Railroad, about three miles south of Forest. Its products are kiln limestone, dolomite flux, commercial sizes, and agricultural screenings.

The most pronounced features of this plant are positive control of the volume of material handled throughout the plant by the use of storage bins and surge bins, variable speed feeders from these bins, and automatic electric interlocked operation to prevent damage to equipment and accidents to personnel. Crushing and sizing are separated into two independent operations. Screening and reduction of the coarser product are divorced from the handling of the product less than 1½-inch ring size.

It had been the experience of the owners that it was rather difficult and costly to install any newly developed machinery in an old plant; therefore, it was decided to remodel the present plant and its new additions in such a manner that there would be ample room for expansion.

The principal operations are crushing, coarse screening, reduction crushing, and fine screening. The plant is built to handle, at present, 300 tons per hour. All this can be crushed to 1¼-inch minus, without loss of quarry production. This output can be increased to 600 tons per hour without disturbing the present installation and operation, by duplication of machinery units.

Method of Primary Crushing

The quarry face is operated at a 65-foot depth and a Marion No. 70 electric shovel with 3½-yard bucket loads the blasted material onto six White trucks. A Marion No. 40 steam shovel with 1½-yard bucket is used for minor loading operations. At present, the pit for the 42-inch Superior McCully primary crusher has not been completed, and the No. 10 secondary McCully crusher is used as primary unit. A heavy reinforced concrete floor is built flush with the rim of the crusher hopper and the trucks dump their loads directly into crusher. The average load per truck is about 7 tons. The time interval necessary for dumping at the crusher is relatively small and, at maximum production, 45 loads can be dumped per hour. When the 42-inch crusher is in operation the trucks will dump on two sides of the crusher.

Coarse Screening Plant

A 400-ft.-center inclined 30-inch Stephens-Adamson belt conveyor dumps the run from the primary crusher into a 72-inch by 24-foot rotary screen at

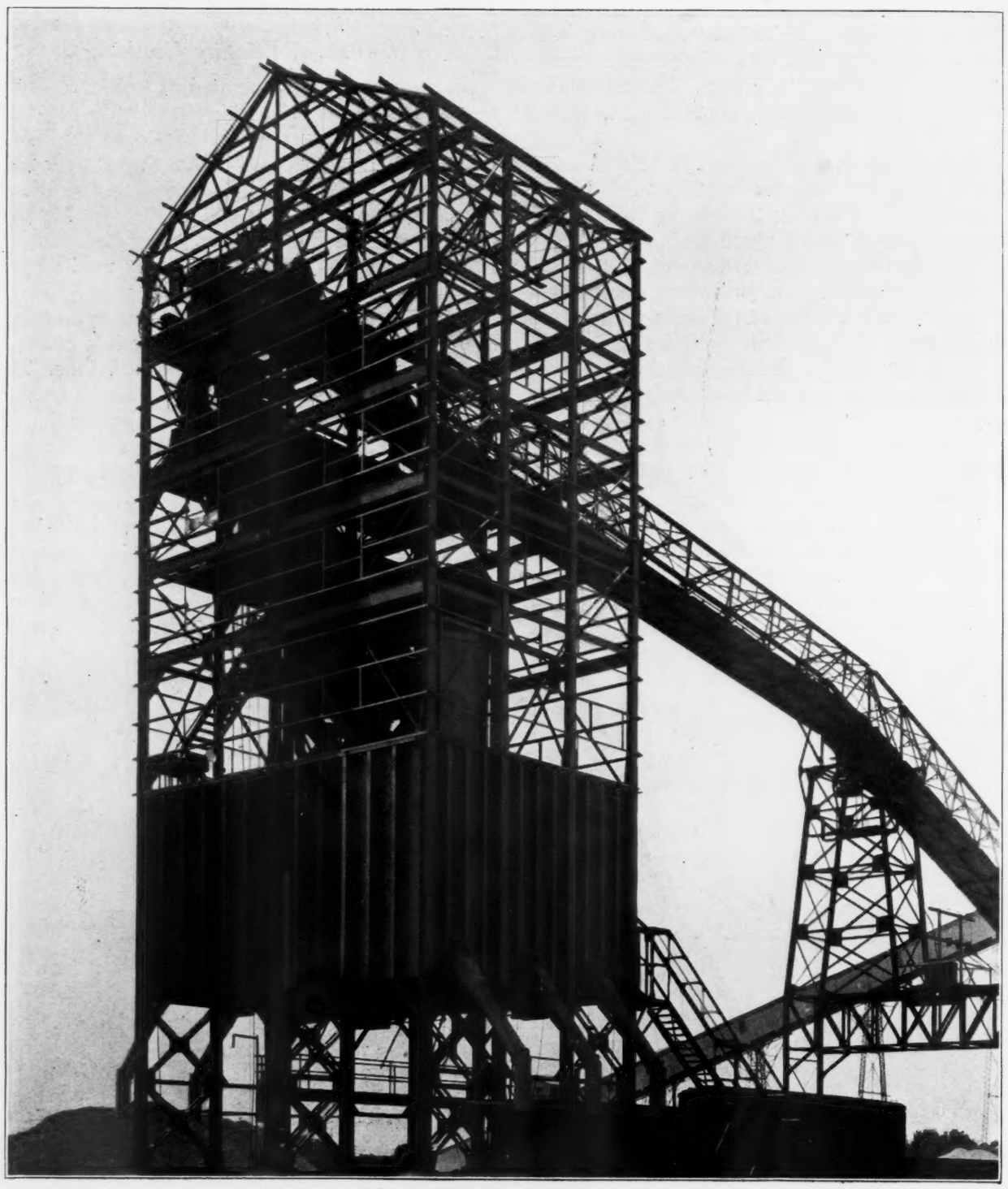
Lime Plant (left), Coarse-Screening Plant (center), and Fine-Screening Plant (right)

the coarse-screening plant. This screen scalps all material minus 1½-inch, and sizes products above 1½-inch. The minus 1½-inch is conveyed, by a collecting belt, to a surge bin ready for the fine-screening plant. Sizes above 1½-inch are deposited in bins located in the coarse-screening plant and over the two loading tracks.

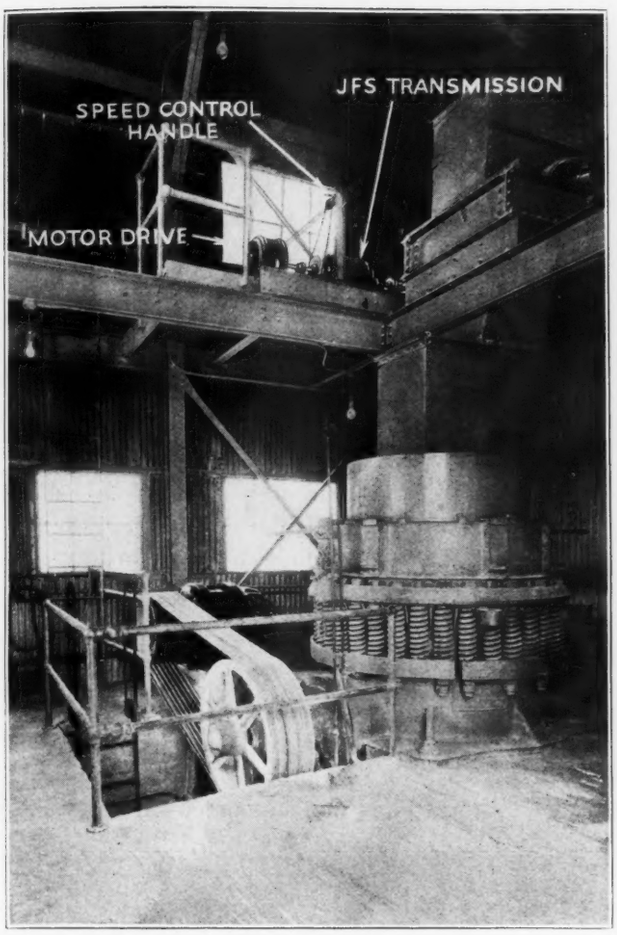
Reduction Crushing Operation

Stone sizes above 1½-inch are rather expensive to handle for storage purposes. This plant eliminates this. Only an emergency storage is kept of the larger sizes and, if temporarily there is no market for this product, all of it is run through a 4-foot Symons cone crusher and reduced to minus 1½-inch.

The several discharges from the rotary screen are so arranged that the flow can be diverted to a storage bin. Under this bin is a Stephens-Adamson belt feeder, driven through a J. F. S. variable speed changer. The turn of a crank on this machine will regulate the speed of the conveyor and, with it, the feed of the Symons cone crusher. This assures a uniform load on the 18-inch S-A belt con-



The Herzog Fine-Screening Plant



Symons Cone Crusher

Loading Gates, Fine-Screening Plant

veyor which dumps onto the 30-inch conveyor bringing the stone from the primary crusher.

Since the material coming from the Symons cone crusher is a circulating load within the plant, it was vital that the quantity could be regulated readily to prevent flooding of screen or conveyors. The variable speed changer performs this duty satisfactorily.

Electric Interlock for Machinery Drives

The primary and cone crushers are driven from slip-ring motors by means of Texrope drives. Allis-Chalmers and General Electric motors are used with Cutler-Hammer starting equipment.

The crushing and coarse screening is a self-contained independent unit. With the exception of the crusher drives, all motors are operated with push-button starters. All the starting equipment is electric interlocked. In case of failure of one unit, this system of wiring will automatically stop all units preceding, thus preventing damage to machinery and accidents to personnel. When the primary crusher stops, a siren blows and gives warning to stop the dumping of trucks. This interlock also renders it necessary for the operator to start machinery in proper sequence.

One of the illustrations shows the push-button panel for the coarse-screening plant. Individual additional control stations are located at convenient places along conveyor galleries and walkways. These push buttons are of the stop, start, and safe type and, to prevent accidents, a rule is enforced that only the operator engaging the safe stop switch is entitled to release it.

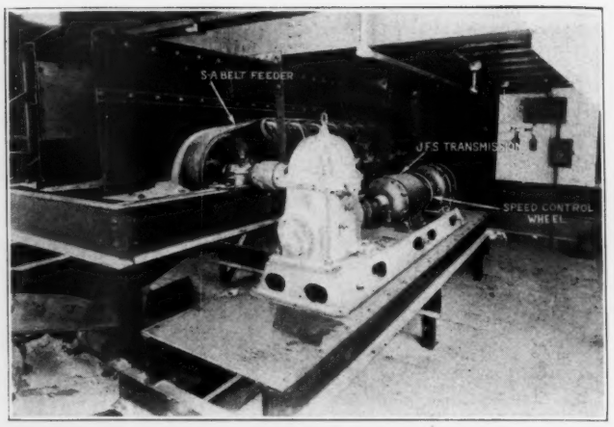
Fine-Screening Plant

The tendency in the stone trade is towards smaller-sized aggregates for concrete material. Also, a wide variation in percentages of different sizes of stone is called for, and the custom demands a clean product. The fine-screening plant was designed to give the operator the most flexible arrangement.

All of the sizing is done with Niagara vibrator screens and sufficient headroom is provided for installation of a washing system. All material minus 1½-inch is collected at the coarse-screening plant in a storage bin holding 150 tons. From this bin, the stone is fed by an S-A belt feeder onto a 30-inch inclined S-A belt conveyor of 275-foot centers.

The belt feeder is equipped with a J. F. S. variable speed changer, same as the feeder to Symons cone crusher in the coarse-screening plant. This is an important feature of this installation. By means of this variation, the feed can be so regulated as to achieve the maximum screen efficiency. The 30-inch belt conveyor and all other conveyors and belt

Control Board, Coarse-Screening Plant



J.F.S. Transmission Unit

feeders are equipped throughout with S-A ball-bearing carriers and return idlers. The drive for this conveyor consists of a motor and a direct-connected Falk herringbone gear-reducer.

The six vibrator screens are of the double-deck type and have a 3-ft. by 6-ft. screen surface. The inclined belt conveyor discharges into a bifurcated chute equipped with a fly-gate. The screens are arranged in pairs on three floors. In the event of a needed change in screen cloth, or if, for any reason, one of the screens should be out of operation, all of the flow can be diverted by the fly gate to one set of screens and the plant still will be able to operate, although at a reduced capacity.

The chutes taking the discharges are hinged to make the screen decks easily accessible. Also, hinged skirt-boards are provided to eliminate all spillage. The screens are supported on rigid spe-

Floor on Top of Bins in Fine-Screening Mill

cially designed structural-steel supports. The vibrators are driven from 5-h.p. motors by Texrope drives.

Disposition of Mixed Sizes

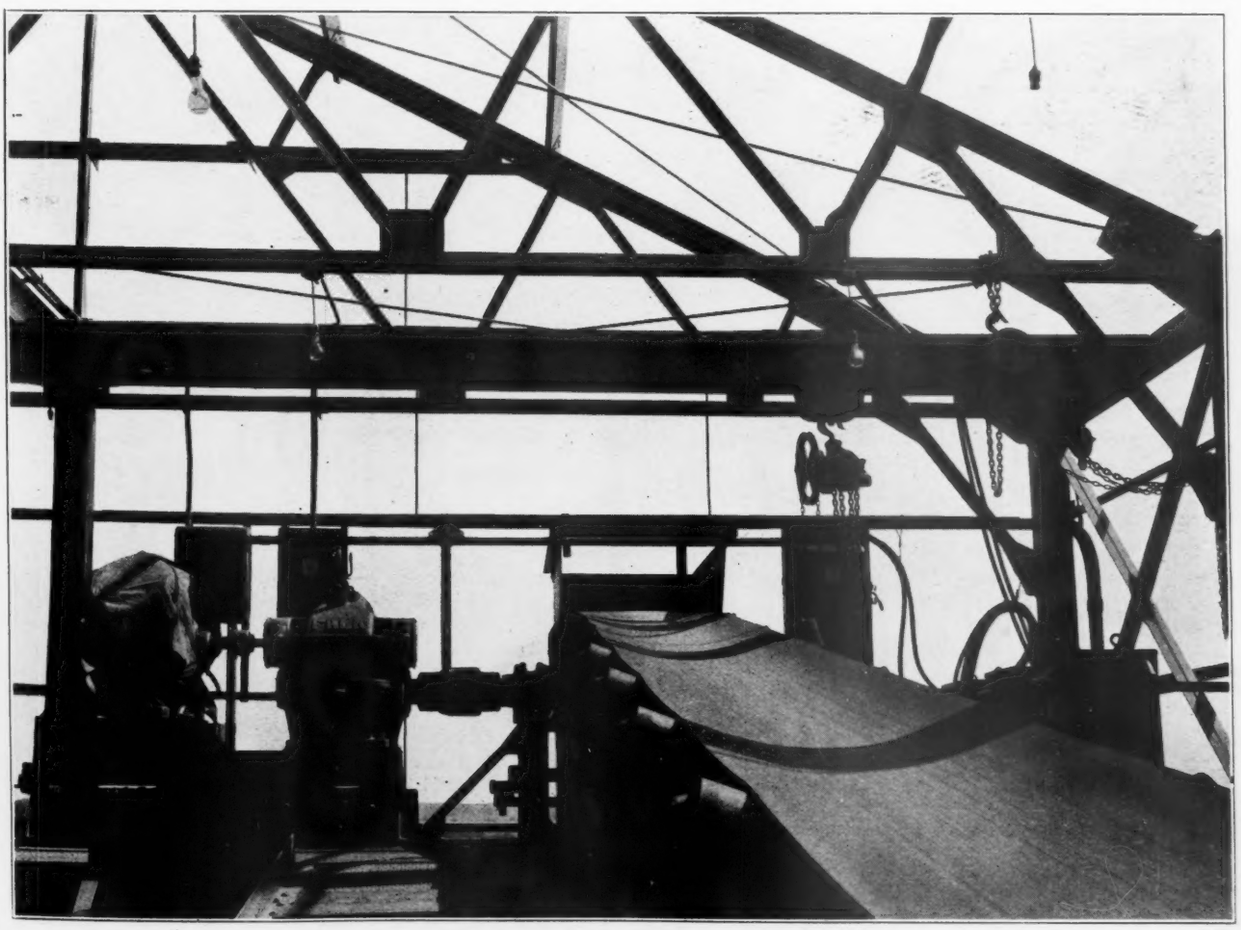
The discharge chutes from the screens are so arranged that they either deposit the material in the proper bin compartment or divert it onto a mixing conveyor running over the top of the bins and discharging into one of the compartments. By means of fly-gates in the chutes, it is possible to collect, on the mixing belt, various combinations of sized stone; thus, this plant is able to cater to the most exacting customers.

The fine-screening operation is also an entire individual unit and all units are electrically interlocked the same as the crushing and coarse-screening plant. As long as there is a storage in the surge bin, this unit can operate independently of the rest of the plant. If the fine-screening plant is shut down, the coarse-screening plant can operate independently until the surge bin is filled. This bin is equipped with an automatic limit switch, which is so connected as to cause the siren at the primary crusher to blow when a certain limit of capacity is reached.

Loading End, 400-ft. Conveyor

Loading Trucks and Cars From Bins

The capacity of the bins containing the finished product is 150 tons for each of six different sizes. The two loading tracks are directly under the bins and the finished product is discharged directly into the railroad cars through special cast-iron gates.



Discharge End of Conveyor to Fine-Screening Plant

Through side outlets on the bins, trucks can be loaded without interference with railroad operations.

The track scales are located in the coarse-screening mill. A crossover is to be installed in the track between the two plants to facilitate car switching.

The original plant was converted into the coarse screening plant. The timber structure was heavily reinforced by substituting steel for the main supporting members. The conveyor gallery and the fine-screening plant are built entirely of structural steel members. The mill floors are fabricated of checkered floor plates. All connections in steel work are riveted to eliminate all possible vibration due to the use of vibrating screens.

The fine-screening plant bins are of heavy structural steel-plate construction. To prevent corrosion, the inside was covered with bitumastic paint, and to prevent wear, the sides were covered with renewable wooden siding. All chutes were provided with stone boxes to take the wear and shock of free dropping stone. The most critical inclined chute sections and the skirt-boards of feeders were lined with Amorite rubber. Rolman manganese-steel screens are used on the rotary screen.

All of the above machinery, the crane, the beams, and the chain hoists are so located as to facilitate any repair work. The Bellefontaine Bridge & Steel Company furnished the fabricated structural steel for the buildings, and Stephens-Adamson Manufacturing Company furnished all chutes, spouts, supports, and conveying equipment.

Electrical Equipment a Feature

The Ohio Power Company delivers 2,300 volts to a centrally-located switch-house. Due to the large distances to the different mills, a 2,300-volt electric distributing system was installed. From the switchboard parkway, underground cable was laid to different mill locations. These cables bring the 2,300-volt current to 440-volt transformers and only short distributing lines are required to bring current to the motors, which operate on 3-phase, 60-cycle, 440 volts. This arrangement resulted in a saving of cost of original installation as well as in eliminating line losses.

The electric shovel is equipped with a leading power factor sychronous motor. In addition to this, static condensers are used for power-factor correction. Since the Ohio Power Company rates the power consumption according to power-factor efficiency, the installation of the sychronous mo-

Control Board, Bifurcated Chute, and Screens

tors has resulted in considerable saving of power expenditure.

The operating force of the entire screening and crushing plant is small. One man is required at the primary crusher. One man operates the coarse-screening and reduction units. Besides the usual loading crew, there is one man to keep the plant clean. The fine-screening plant is all operated from one central push-button switch board and one operator is sufficient, except when there is screen cloth to be changed or other repairs to make. High-pressure lubrication is used throughout and one oiler can take care of the entire plant.

The company also operates a 12-kiln lime burning and hydrating plant, which was built in 1923. Mr. Bert Herzog is president and general manager. Mr. William Wentz is general superintendent.

Rock Drilling in Quarries

(*Continued from Page* 56)

most powerful type requires approximately 200 cubic feet of air. Assuming that in either cases the machines would operate at about 75 to 80 pounds per square inch, and after allowing some margin for losses, this difference means that instead of a compressor requiring about 40 hp., it is necessary to install one consuming about 60 hp. These figures are, of course, very approximate because the conditions vary a little in every place, but the fact that more power is required often appears to the operator as being a somewhat alarming situation.

If, on the other hand, you consider that with a piston drill you have to keep a 40 hp. plant in operation continuously all day to get down one hole, it will be very obvious that there must be a considerable saving on the total power bill per ton of stone if, by using a 60 hp. compressor, you are able to operate a drill which will give you three, four, or in some exceptional cases, six or seven times as many holes in the same period of time. In other words, it is possible to arrange the drilling in a quarry so that instead of having to be content with one or two days' drilling, and producing a small quantity of stone sufficient to supply the breakers, one could put in several days' drilling, boring a vastly greater number of holes, which could be fired simultaneously, and the necessity for keeping the rock drill and power plant in continuous operation disappears.

This method is not possible in all cases, of course, but in many quarries it is.

On the other hand, some owners have arranged their method of working so that they are getting an output which is several times greater than they did before, with only a negligible addition to their rock drill operating power plant. This is a point which sometimes escapes quarry owners' attention, and I mention it because if any of you have under consideration the question of modernizing your quarry, you should consider whether the air plant which you have already installed, or which you are likely to install, is going to have sufficient capacity to keep pace with the air requirements of modern rock drilling machinery.

The point to bear in mind most particularly is that the actual air consumption today, per ton of stone produced, is considerably less than you could ever hope for it to be using with earlier types of drills.

The question as to which is the most economical form of producing compressed air is dependent largely on local conditions. Many quarries still use steam as a prime mover, and while there is no question as to the convenience and elasticity of steam power plant, the question as to whether, under present conditions, it can compete with electricity or oil again depends very largely on local conditions.

Where the quarry is of such a character that the whole of the plant can be driven from one central point, I believe it is doubtful but that crude oil is the cheaper method. Where there are numerous scattered drives, electricity, provided it can be purchased at a reasonably low figure, has points in its favor.

American Firm to Build Chilean Highway

The long-discussed road from Concepcion, Chile, capital of Province of that name to Talcahuano, principal port of the Province, will be constructed by an American company, according to Vice Consul Canden L. McLain in Commerce Reports. The contract, awarded November 8, 1928, calls for the construction of the road within 12 months of its date, at a cost of 2,500,000 pesos ($302,500).

The road will be 5.36 miles long and 11.6 meters (38 feet) wide, and will be paved to a width of 6 meters (19 feet 8¼ inches), with warrenite bitulithic. On either side of that paving will be a strip of macadam 50 centimeters (19.7 inches) wide, treated with asphalt, and having a shoulder 1 meter wide.

Contractors to Maintain Road for Seven Years

The contracting firm will maintain the road for seven years after its completion, at a total cost of 95,000 pesos ($11,495), at the rate of 15,000 pesos annually for three years, beginning two years after the road is completed, and 25,000 pesos annually the last two years.

All expenses provided for during 1928 in the decree announcing the contract will be charged to a loan authorized in February, 1928. The total payment for the contract will be obtained from road taxes provided for in the extraordinary budget of 1929.

Federal Bureau Is Studying Quarry Costs

By J. R. THOENEN*
Mining Engineer, U. S. Bureau of Mines

DURING the year 1927 the Bureau of Mines, at the request of a number of quarry operators, undertook to make a study of quarry operating costs in order to determine average costs for certain operating conditions and to suggest a model cost accounting system for quarry operations.

A detailed questionnaire was prepared and mailed by the bureau to all quarries on its records as employing ten or more men in 1926. The questionnaires were received by the operators during the height of their production season and, for that reason, many replies were delayed. The success of any study of this nature necessarily depends upon a large volume of replies, so that comparable groups may be segregated and averages presented without disclosing any single operator's figures. This makes necessary the hearty cooperation of the whole industry.

In order to acquaint the industry with concrete evidence of the object and value of this study, the replies from producers of limestone received up to November 1, 1928, were tabulated and presented to the National Crushed Stone Association at its annual convention in Cleveland in January, 1929. Considerable interest was aroused and many operators who had not previously contributed statements promised immediate cooperation.

With this encouragement the Bureau has decided to make general distribution of the compilations to date with the hope of stimulating further interest and thereby obtaining a larger volume of data from which to compile the final tabulations.

Fourteen tables have been thus compiled. These are headed, respectively:

1. Quarry and overhead costs per short ton
2. Removing loam and clay overburden from 44 limestone quarries
3. Drilling in 44 limestone quarries
4. Blasting in 63 limestone quarries
5. Loading costs at 54 limestone quarries
6. Loading costs at 53 limestone quarries
7. Loading costs at 26 limestone quarries
8. Power-shovel duty at 41 limestone quarries
9. Transportation at 84 limestone quarries
10. Crushing costs at 35 limestone quarries
11. Crushing costs at 28 limestone quarries
12. Storage costs at 11 limestone quarries
13. Drying costs at 9 limestone quarries
14. Screening, elevating, and conveying costs at 10 limestone quarries.

Table 1 is reproduced herewith. The entire set may be procured by applying to the bureau's headquarters in Washington, D. C., for a copy of Serial No. 2911.

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Table 1.—Quarry and Overhead Costs Per Short Ton, 1927

Stone for:	Loading method	No. of quarries	Average daily stone production	Average quarry cost	Per cent	Average quarry and crushing cost	Per cent	Average overhead cost	Per cent	Average total cost
Lime	Hand	6	134	$0.86	70	.....	....	$0.36	30	$1.22
Lime and crushed stone	Hand	6	237	.....	....	.79	72	.30	28	1.09
Lime and crushed stone	Shovel	6	1023	.....	....	.57	63	.34	37	.91
Lump and rip rap	Hand	6	248	.81	73	.....	....	.30	27	1.11
Crushed stone	Hand	15	331	.....	....	.94	80	.23	20	1.17
Crushed stone	Shovel	12	1200	.....	....	.63	75	.21	25	.84
Pulverized stone	Hand	5	93	.....	....	.95	74	.34	26	1.29
Cement	Shovel	33	1243	.35	62	.42	75	.14	25	.56
Cement	Shovel	2	310	.....	....	.60	70	.25	30	.85
Cement	Shovel	10	754	.....	....	.42	74	.15	26	.57
Cement	Shovel	11	1203	.....	....	.39	74	.14	26	.53
Cement	Shovel	5	1650	.....	....	.44	76	.14	24	.58
Cement	Shovel	5	2275	.....	....	.35	80	.09	20	.44

Operators are requested to study these tables carefully and criticize them freely. Suggestions are solicited and welcomed as to alterations or additional groupings tending to bring out information not already shown, so that the final report when completed will present the greatest possible amounts of information.

It is hoped that all possible returns will have been made by June 1, 1929, so that final compilations can be started on that date and the resultant report be presented during the current year. To enable the bureau to do this, all operators are requested to send in completed questionnaires as early as possible.

Final tabulations will cover trap, granite, and sandstone in the same manner that limestone is treated in these preliminary tables.

Résumé of Construction Projects in Canda

With the approach of the spring season, building in Canada is becoming increasingly active. Among projects recently reported by Trade Commissioner E. G. Sabine, Montreal, are the following: A $100,000 oil-storage plant and a 10-story office building costing $275,000 at Vancouver; a $500,000 residence, a $400,000 warehouse, a $160,000 aircraft factory, an incinerator plant to cost $500,000, and sewers costing $107,000, Montreal; a $100,000 addition to a tire plant at Kitchener, Ontario; improvements to electric plant and waterworks amounting to $210,000, and a $250,000 addition to a silk factory, London, Ontario; a telephone building costing $325,000 at Edmonton, Alberta; an industrial research building to cost $2,000,000 at Ottawa; remodeling of a church to the amount of $250,000 at Toronto; and a $140,000 church at Kenogami, Quebec.

Recent Higher Court Decisions Involving Sand and Gravel Operators

By LEO T. PARKER

GENERALLY speaking, contracts of sale in restraint of trade are invalid and unenforceable if it is shown that the real intentions of the contracting parties are to effect financial injury to competitors by controlling the market, eliminating competition, forcing competitors out of business, or other unfair competition. However, such contracts are valid if the purpose of the restrictive agreement is merely to protect the contracting parties in the ordinary course of their business.

For instance, in Cramer v. Lewes Sand Co., 140 Atl. 803, it was disclosed that the owners of a foundry and a sand company entered into a contract whereby the latter agreed not to sell sand to other foundries and the owner of the foundry agreed to purchase all of the sand required in conducting its business from the former. The important clause in the contract reads as follows:

"1. The sand company agrees that, for the period of five years from the date hereof, it will sell to Cramer [owner of foundry] and to him exclusively, sand to be used in the manufacture of castings and in the iron and steel trade in general, and that it will protect Cramer in this trade and will not quote prices or sell or deliver any sand to be used for the said purposes to any other dealer or manufacturer, unless authorized to do so by Cramer in writing. And the said Cramer agrees that during said period he will purchase from the sand company all beach sand to be used or sold by him for said purposes and will not sell any other beach sand for said purposes."

About two years later the owner of the sand company wrote a letter to the foundry cancelling this clause of the contract and stating that he intended to quote prices and to sell sand to competitors of the foundry. The owner of the foundry filed suit against the sand company to recover damages for the breach of the contract proving that the latter had violated the agreement by selling sand to other foundry firms. The sand company attempted to avoid liability by testifying that it had written the letter to Cramer, the owner of the foundry, because they were dissatisfied with the number of orders which he was sending in. The sand company also proved that it had first notified the other foundries, to whom they had made sales in violation to the contract, that they would not accept the orders if the prospective purchasers were in the foundry business, and that these firms had stated that they did not intend to use the sand for this purpose.

However, the Court held Cramer entitled to recover damages for breaching the contract, saying:

"A man cannot enter into an agreement of the character found here and defend himself against a charge of violating it, by showing simply that he notified others that the contract with its inhibitions was in existence and that he would not sell in violation of it, when circumstances exist which would reasonably suggest that inquiry and investigation be made to see if he was being led into breaches of the agreement. When suspicious circumstances do exist, the obligated party, in order to be relieved of liability, is bound to the active exercise of such degree of diligence in seeking the facts as will persuade the mind that he is acting in entire good faith towards him to whom he is bound. He is required in the face of such circumstances to do something more than rest contentedly upon a mere declaration that his contract binds him not to sell to others and that he relies upon such others to see to it that his good faith with his contractee will be protected by them. He owes a duty to be active himself in securing a faithful compliance with his obligation. . . . Damages for breach of an agreement in restraint of trade are measured by the loss sustained by the plaintiff (foundry) by reason of the violation of their agreement, and not the profits made by the seller."

A Sand Company Is Liable for Contract Made by Employe

It is well established that a firm is liable for all acts committed by employes who act within the scope of the employment. This is particularly true with respect to contracts made by employes who are authorized to transact business of this character.

For illustration, in Heard v. Monroe Sand & Gravel Co., 116 So. 386, it was disclosed that a landowner named Heard assisted an employe of a sand and gravel company to obtain a contract with another landowner named Faulk by which the sand company was given the exclusive right to remove gravel, sand and clay from Faulk's land. On the day following the signing of this contract the employe of the sand company entered into another contract agreeing to pay Heard 2½ cents per cubic yard for all sand, gravel and clay removed from Faulk's land as a bonus or commission for having induced Faulk to sign the contract.

The sand company immediately began to actively mine the material and for three years the employe regularly paid Heard 2½ cents bonus. After three years the sand company refused to pay Heard further commissions, and the latter sued to recover damages.

The sand and gravel company attempted to avoid liability upon the contention that it had not authorized its employe to agree to pay Heard a commission on the amount of the gravel taken from Faulk's land and that the sand company also stated that although its representative had made regular payment to Heard out of the funds belonging to the company, he did so without authority.

Nevertheless, the verdict of the Court holds the sand company bound to pay Heard 2½ cents commission.

In Lutesville Sand & Gravel Co. v. Western Union Telegraph Co., 296 S. W. 252, it was disclosed that a sand-and-gravel company received a telegram from a highway contractor requesting shipments of three cars of gravel daily until further notice. About three months later the contractor dispatched the following telegram to the sand company:

"Lutesville Gravel and Sand Co., Cape Girardeau, Mo. Stop shipment material until further notice."

The message arrived at the telegraph office in the city in which the sand company was located, but it was carelessly filed away and remained undelivered. Not having received the message, the sand company continued to make the usual shipments daily. Soon afterwards the contractor wrote a letter stating he had sent the telegram.

The sand company ordered the railway to return the several cars of gravel and filed suit for damages against the telegraph company. The latter denied its liability upon the ground that since the contractor had telegraphed the cancellation the contractor only was entitled to sue and recover damages.

Notwithstanding this contention, the Court held the sand company entitled to recover the damages sustained, and explained the law, as follows:

"We are quite familiar with the doctrine generally accepted in this country that one who takes the initiative in using the telegraph as a medium of communication makes the telegraph company his agent for the purpose of communicating his message. This rule is based upon the theory that, if either sender or sendee must bear the loss occasioned by the errors or negligence of the telegraph company, it is more equitable and just that the sender, who has selected the telegraph as a means of communication, should be the one to suffer. However, even though the above is true, it nevertheless does not follow that plaintiff (gravel company) may not recover directly from defendant (telegraph company) for such *special* damages as it may have sustained through the breach of public duty to deliver the message in question with reasonable promptness.

In M. S. Cohn Gravel Co. v. Southern Surety Co., 264 Pac. 206, it was disclosed that a highway contractor entered into a verbal contract with a gravel company whereby the latter agreed to furnish gravel to the former, from its pits in Oklahoma, to be used for the construction of a highway in the state of Oklahoma. The gravel company was incorporated under the laws of the state of Arkansas, and at the time of making its contract with the contractor had not complied with the laws of Oklahoma relative to foreign corporations before doing business in this state.

The gravel company delivered a large quantity of gravel to the contractor pursuant to the contract, for which the latter owed a balance of $5,622.40. To recover this amount, the gravel company brought suit against the surety company, with whom the contractor had executed a statutory contractor's bond insuring payment for all materials and labor used in the construction of the highway. The surety company denied its liability on the contention that the gravel company was an Arkansas corporation and had not complied with the laws of the state of Oklahoma which require that foreign corporations must file with the secretary of the state a certified copy of its articles of incorporation, and shall have paid the fees required by law.

Although the higher Court sustained the law that the gravel company was barred from filing suit against the contractor, it held that, since the latter had not pleaded this defense before the Court, the gravel company was entitled to collect from the surety company the amount owed by the contractor. This Court said:

"If these provisions of the law were enacted for the public good, contracts made by foreign corporations without having complied with such provisions are void; but if they were enacted for the purpose of protecting private rights of the parties interested, such contracts are void only when declared so by the citizen with whom the contract is made. . . . It is not the policy of the statutes of this state to exclude foreign corporations from transacting business in this state. Obviously, the primary purpose of these provisions is to protect citizens and residents of Oklahoma in transacting business with foreign corporations. It was intended that they should bring themselves within the law, so that service of process could be had upon them, and give such citizens who desire to deal with such corporations an opportunity to ascertain from the public records the financial standing of the corporation, and the names of its officers . . . if the contract is founded on a meritorious consideration, as in this case, *and the citizen of the state does not repudiate the contract* and claim the defense given him by the statute, both parties invoke the contract as the basis of their rights and obligations, who should be permitted to plead the statute? The answer is, 'No one'."

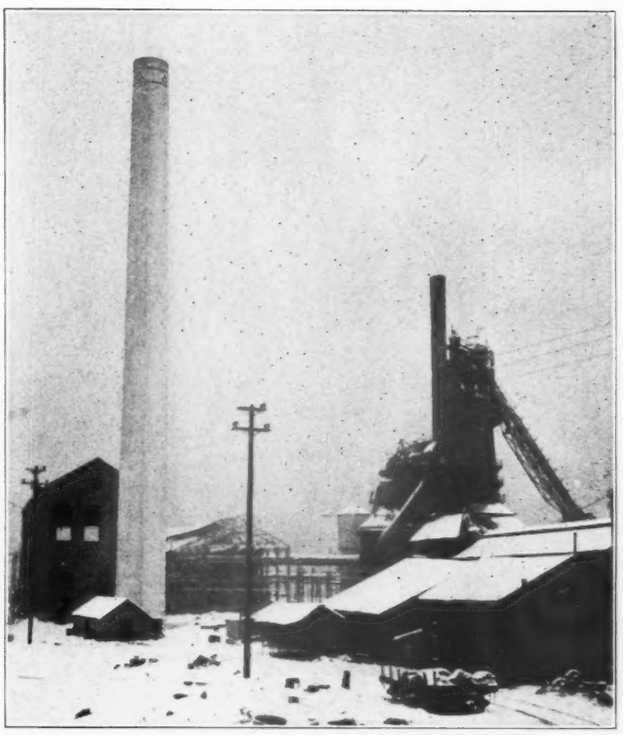
Davison Coke and Iron Company Is Building Wet Process Cement Plant on Neville Island

A Composite of Blast Furnaces, By-Product Coke Ovens and Cement Plant Is Being Constructed

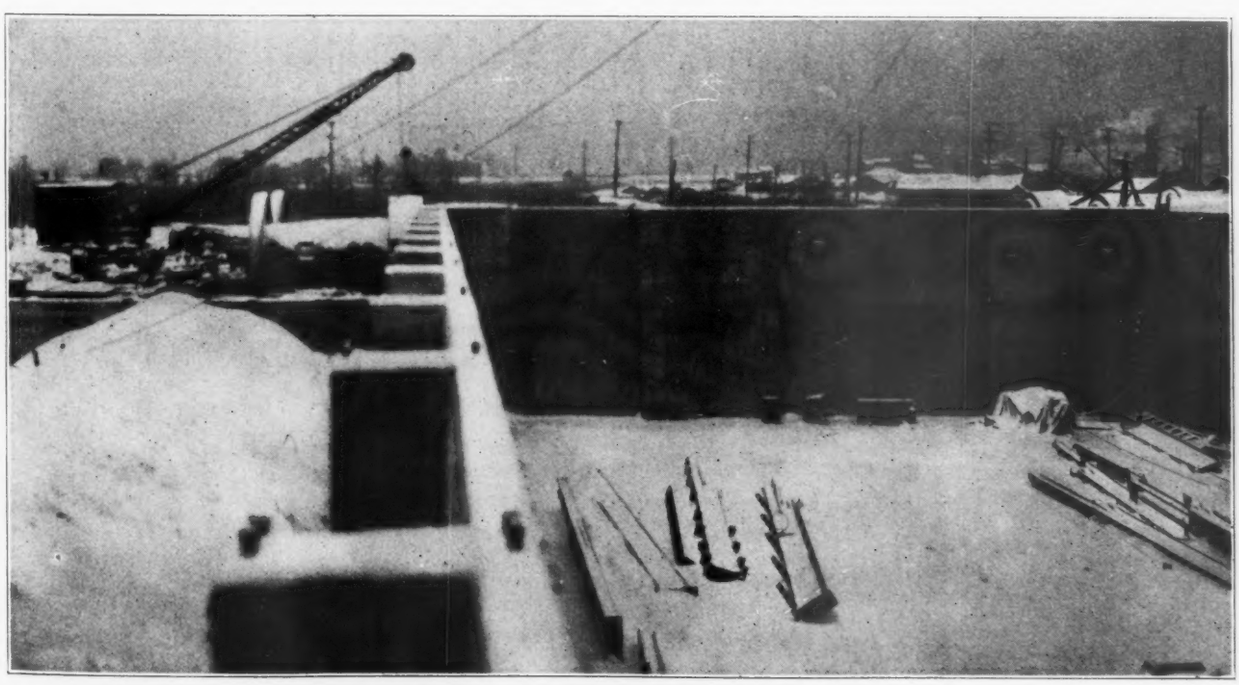
By W. E. TRAUFFER,
Assistant Editor, Pit and Quarry

THE Davison Coke and Iron Company of Pittsburgh, Pennsylvania, is building a new 1,250,000-barrel wet-process slag cement plant at Neville Island, Pennsylvania. This plant is of unusual interest not only because of the fact that cement is to be manufactured but because a blast furnace and a by-product coke plant are to be operated in connection with it. These are also under construction.

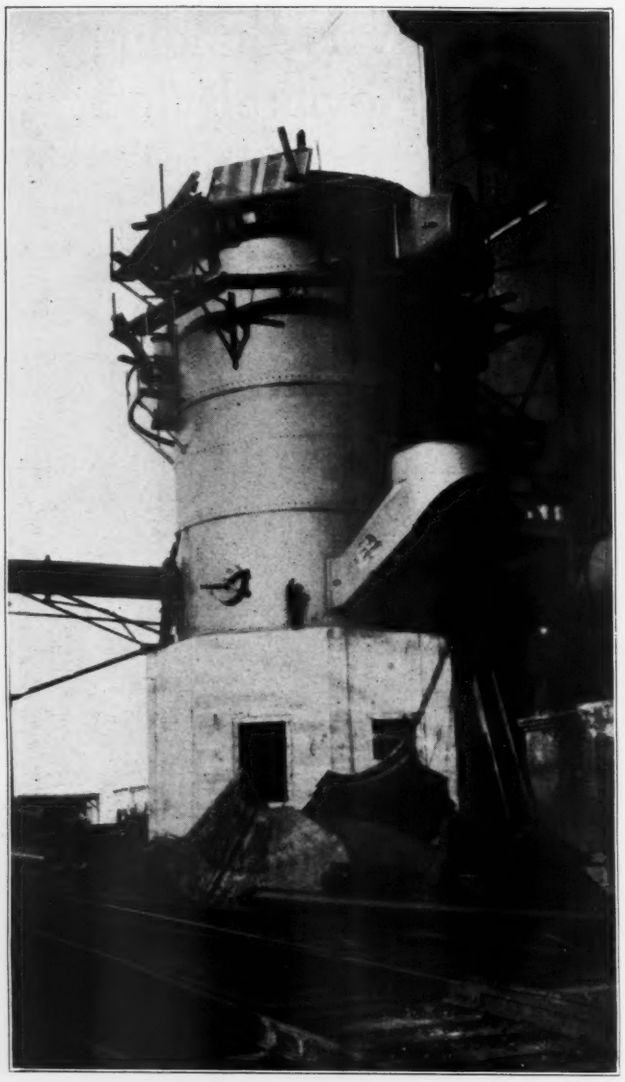
The three plant units are being built adjacent to each other on a 260-acre property near the east end of Neville Island, which is in the Ohio river about five miles northwest of the junction of the Allegheny and Monongahela rivers in downtown Pittsburgh. A blast furnace on the property which was formerly operated by the American Steel and Wire Company is being overhauled and will be in operation early in the summer. It will have a capacity of 600 tons per day. Thirty-five by-product coke ovens are being erected and will be ready for operation in October. Present plans call for 35 more ovens which will be built in the near future. A contract has been let for the construction of a gas holder 219 feet high and 182 feet in diameter.



Kiln-House Stack and Blast Furnace



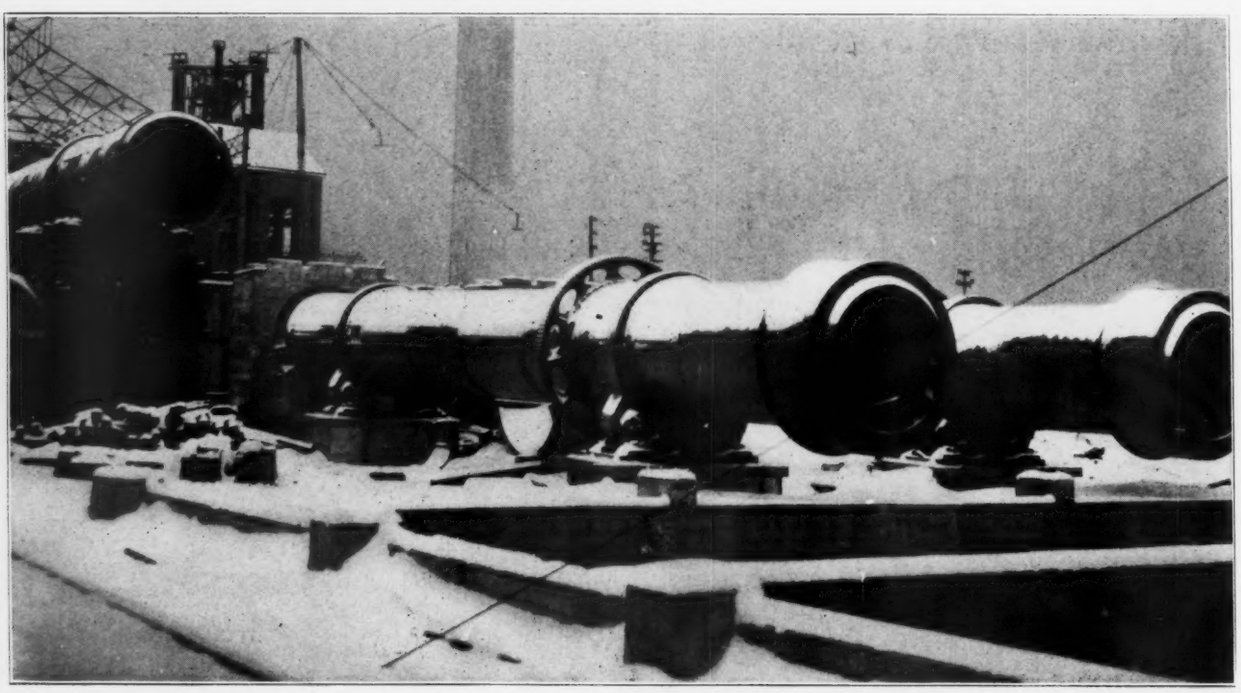
Clinker Storage, with Dry Mills in Background



Washer for Blast Furnace Gas

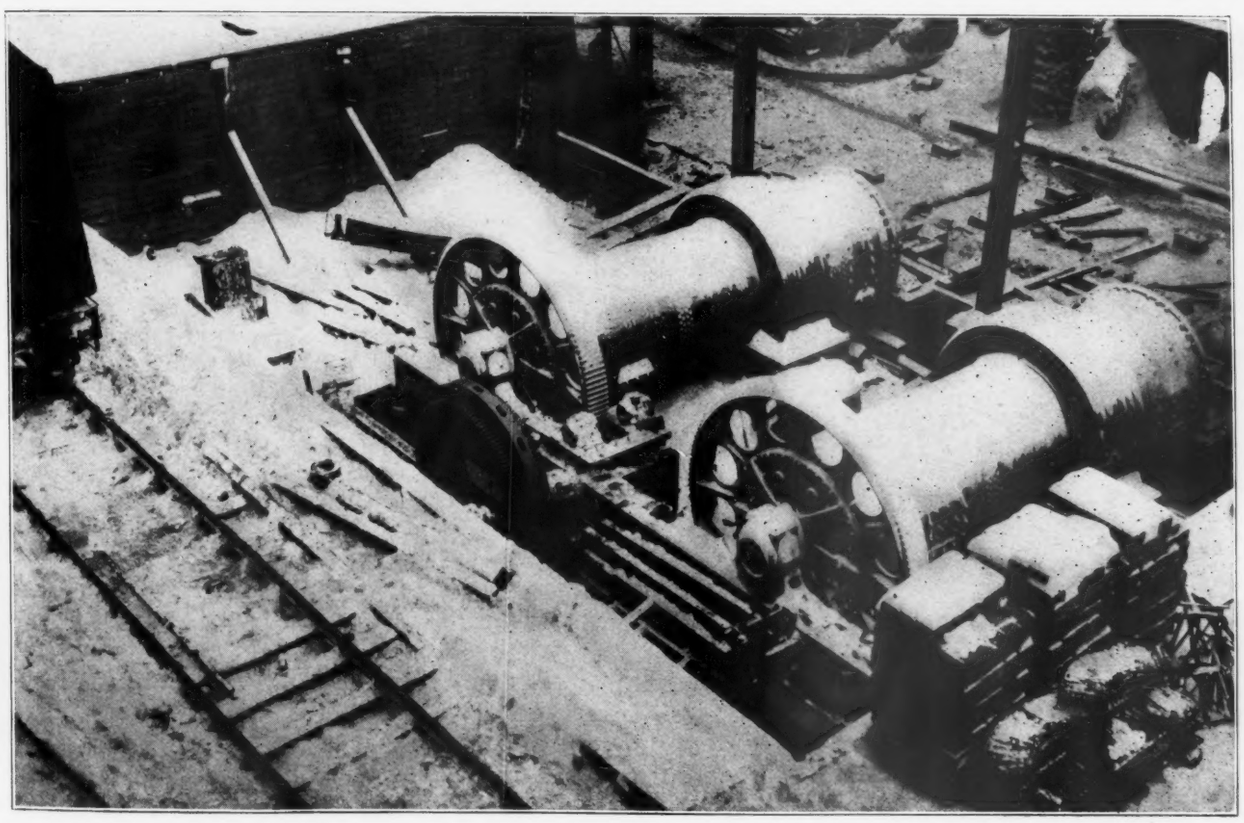
Barge Line Delivering Sand and Gravel

There are several reasons why such a combination of industries was decided upon. One of these is that a blast furnace cannot operate economically unless by-product coke is manufactured in connection with it. Also the biggest factor in the operation of a by-product coke plant is the disposal of the gas produced. Some of this gas could be marketed in the winter but there is very little demand for it in the summer. It was therefore decided to build a cement plant which would use up the slag from the furnace and the excess gas from the coke ovens in the summer when the demand for cement is greatest and to sell the gas in the winter, using powdered coal for the cement-burning operations which would then be comparatively slack. The fact that coal can be obtained very cheaply by boat from points on the Monongahela river will also add to the economy of these operations and was one



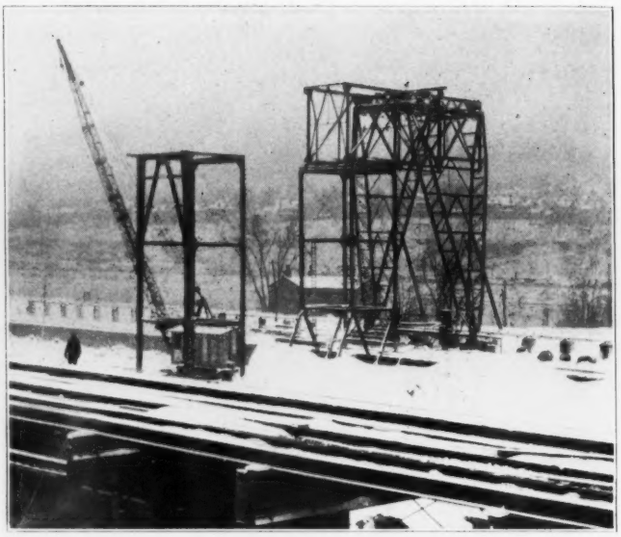
Coolers with Kilns at Left

Whirler Unloading from Barge to Temporary Cement Warehouse



Wet Mill Pit Viewed from Top of Blast Furnace

One Cooler in Place



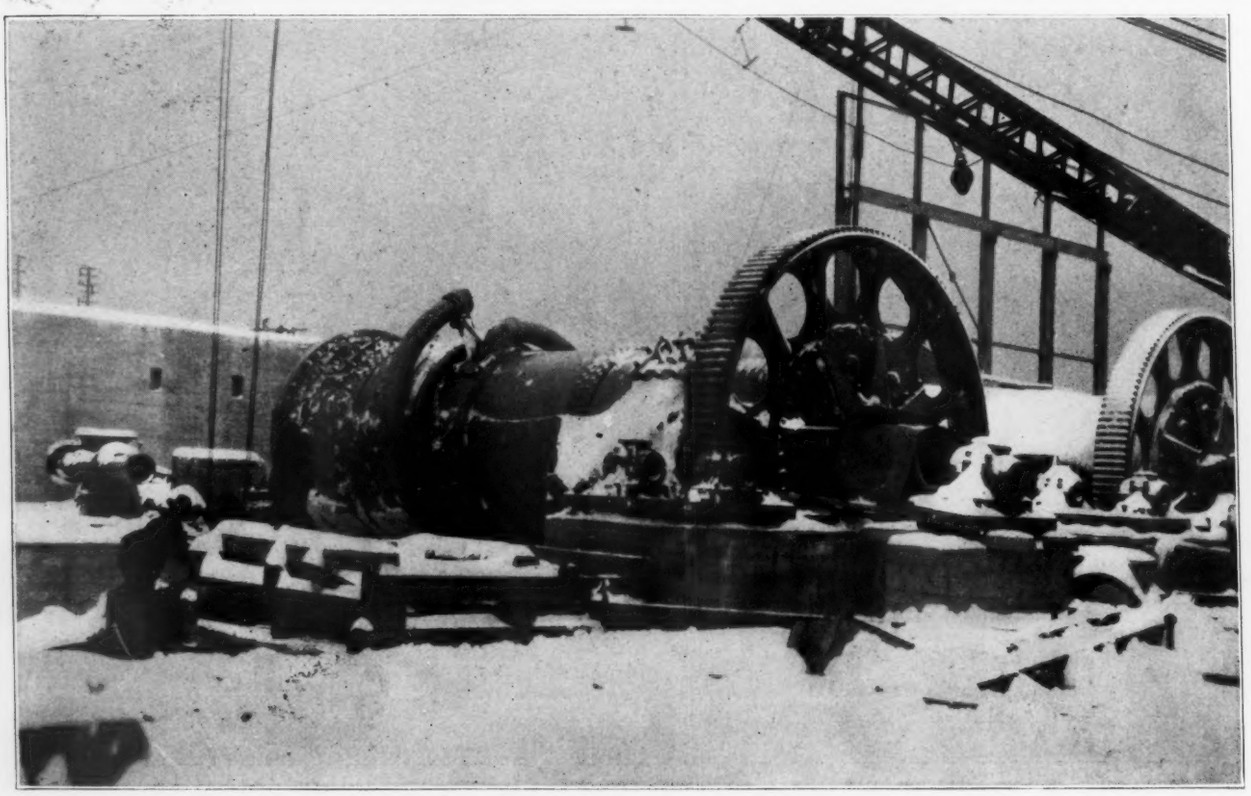
Bridge Crane Under Construction

of the reasons why the site on Neville Island was chosen.

Sand and gravel for the concrete in construction work are brought in by barge and are unloaded by a Dravo whirler into Dravo bins from which these materials are loaded into trucks to be hauled where needed. Green Bag cement, made at the Kenova plant of the Basic Products Company is brought in on the Basic Barge Line. These barges are of all-steel construction and are made at the Neville Island shops of the Dravo Contracting Company, which also built the unloading dock and installed the ore-handling equipment.

A large temporary cement warehouse has been built in which to store the cement. In addition to storing the cement used in building the plant, the warehouse is also a center of distribution from which cement is delivered by truck to all parts of Pittsburgh. The cement is shipped from the Kenova, West Virginia, plant of the Basic Products Company already sacked.

At the present time, the cement plant foundations, silos and slurry tanks are all in, with most of the buildings completed or practically so. The kilns, coolers, and wet and dry mills are installed, together with their drive motors. The office building foundation has been poured and the building itself is under construction. It is expected that the



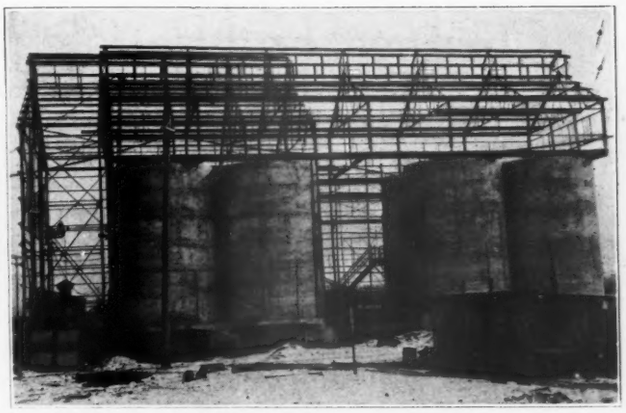
Fine-Grading Mills Being Installed

first cement will be produced some time in May.

The two Allis-Chalmers 8-foot by 7-foot by 26-foot wet mills are immediately adjacent to the blast furnace so that the slag need be conveyed a short distance only. The two 10-foot by 175-foot kilns, two 8-foot by 80-foot coolers, and the two 8-foot by 7-foot by 26-foot fine-grinding mills are also of Allis-Chalmers make. Oliver slurry filters will be used and Babcock and Wilcox waste-heat boilers will use the waste heat from the kilns. Dorr agitators will be installed in the eight circular concrete slurry tanks which were completed several months ago. Fuller-Kinyon pumps will convey the cement from the dry mills to the cement storage silos and from the silos to the pack-house bins. Wilfley pumps will pump the slurry from the wet-grinding mills to the slurry-mixing tanks. Six 3-tube Bates packers will be used for sacking the cement.

The plant will be so arranged that slag, limestone, clay or shale can be used as desired. Gypsum will be purchased from outside sources. All ore for the blast furnace or coal and other material for the cement plant will be unloaded at the dock and handled by the Dravo bridge crane.

All of the foundations, silos and slurry tanks as well as the concrete stack which is 250 feet high were built by the Rust Engineering Company. All of the cement mill machinery was furnished and erected by the Allis-Chalmers Manufacturing Company. The Koppers Company is erecting the by-product coke plant. Allis-Chalmers motors are to be used throughout the cement plant with Westinghouse motors for the other operations.

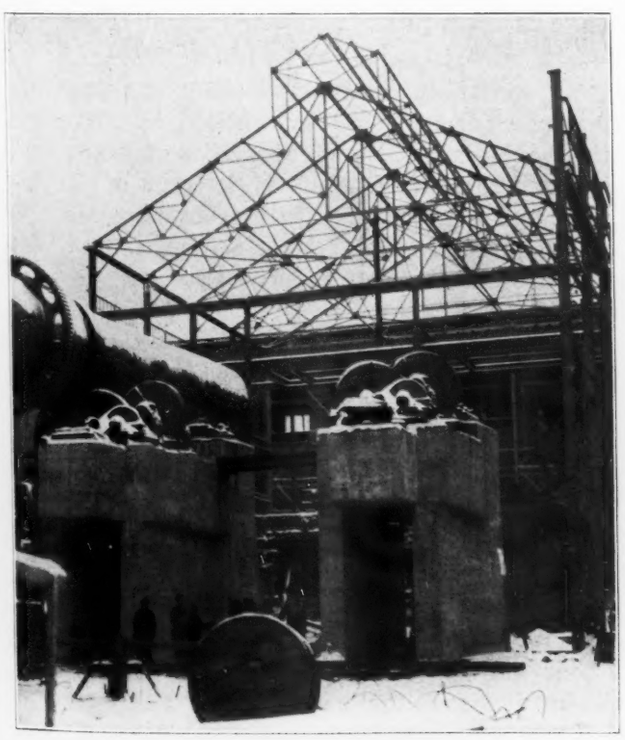


Slurry Tanks and Agitator Building

The Pittsburgh and Ohio Valley Railroad, a short line connecting the operations on Neville Island with the P. C. & Y. and Pittsburgh and Lake Erie Railroads, was built by the same interests and is now in operation. Through connections with these railroads, material can be shipped or received over any of the railroads operating in the Pittsburgh district.

The same interests which are building this new plant also operate the Basic Products Company with a plant at Kenova, West Virginia, where cement, refractories and lime are manufactured, the Sharpsville Furnace Company at Sharpsville, Pennsylvania, and the Basic Barge Line.

Officers of the Davison Coke & Iron Co. are: George S. Davison, president; Allen S. Davison, vice-president and treasurer; and A. P. Meyer, vice-president and secretary. A. M. Kennedy is works manager, and A. G. Smith is general superintendent. Jeoffe Saeger is cement mill superintendent and L. N. Bryant is chief chemist.



Kiln Foundations and Drives, with One Kiln in Place

Foresight Saves Time

In the pit and quarry industries many accidents occur from bank cave-ins, loose rock falls and similar mishaps. An injury to either men or machines means extra costs and loss of time. With men it means attendant suffering.

Good management demands that such accidents be prevented and, in most cases, they can be. It is an excellent rule not to allow banks to stand too steep. Either a blast or a water jet will throw them down. Loose rocks or seamy ledges can be made safe with bars or by mud blasts so that the chance of danger is minimized.

Every operator should make some one responsible to see that these hazards do not exist, or if existing, that they are removed at once. Extra dividends can be made by this foresight and prevention.

Chemical and Petrographic Composition of Slag

DURING recent months, the National Slag Association, with offices in Cleveland, Ohio, under the supervision of Secretary-Treasurer H. J. Love, has published several symposiums pertaining to the characteristics, and uses of blast furnace slag. "Chemical and Petrographic Composition of Slag" is the title of Symposium No. 11 which treats especially on the components of blast furnace slag and gives tables, taken from reliable sources to make public many analyses of the product. The symposium contains 20 tables of analysis which give the conclusions of the different authorities.

According to Richard S. McCaffrey, professor of Metallurgy of the University of Wisconsin, there are only four components in blast furnace slag: viz, silica, alumina, lime and magnesia, which form 17 other compounds among themselves, making 21 constituents in all. This ignores the presence of sulphur, manganese and iron compounds which are usually present in a slight degree.

Among the tables of analysis given is a report of the chemical analyses of slags in 29 plants by Raymond Harsh, junior assistant testing engineer, U. S. Bureau of Public Roads; P. J. Freeman, chief engineer, Bureau of Tests, Alleghany Department of Public Works, Pittsburgh, Pennsylvania, made a number of chemical tests which showed an average 34.44 SiO2, .40 TiO2, 12.74 Al203, .94 FeO, .47 MnO, 39.25 CaO, 9.40 MgO and 1.39 S; Fred Hubbard, consulting engineer for the Standard Slag Company took 191 samples of slag from 28 sources in Ohio and Pennsylvania at monthly periods from November 1926 to November 1927, and reported the tests which are included in the symposium; E. C. E. Lord, petrographer, U. S. Bureau of Public Roads made a chemical and petrographic study of blast furnace slags which included 14 samples selected from furnaces in Illinois, Ohio, Pennsylvania, New York and Alabama which tend to prove the contention that only four components of consequence are found in slag; tests made by the U. S. Bureau of Standards in 1919 showed similar results.

The published tables of tests made by the Carnegie Steel Company and other investigators so nearly agree that the quotation of Gilbert R. Redgrove and Chas. Spackman that, "The quality of the slag produced at any one works, where the same description of iron is being manufactured from one of uniform type, varies within very narrow limits." This is shown by a table covering investigations from 1888 to 1899.

The general opinion seems to be that blast furnace slag is an entirely homogeneous material which is the logical inference from observation of its method of production. However, Dr. A. Guttman, director of research, Eisen Portiand Cement Association, Dusseldorf, Germany, found that this was invariably true of granulated slag, but not always of air-cooled slag. He states "It can be noted from this analysis which is given that the very fine slag dust contained less alumina and more lime than the coarser particles between the 900 and 10,000 mesh sieves (equivalent to 75 and 250-mesh sieves). This appears first as a surprise because blast furnace slag is generally considered very homogeneous. This is absolutely correct as far as granulated slag is concerned, because its form condition is immediately fixed by the sudden cooling. But the case is quite different with the lump slag which cools slowly. ("Investigation Regarding the Stability of Blast Furnace Slag," *Stahl und Eisen*, No. 42, 1926).

Petrography is commonly used as a synonym for petrology which is defined as the science of the study of the origin and constitution of rocks. Whatever term is used, it relates to the mineral composition. The studies of slag pursued by Richard S. McCaffrey included only those composed of silica, alumina, magnesia, and lime, but he found in addition to these four individual constitutents, there were present compounds of them to the number of 17 to 21 constituents in all.

In summarizing, the symposium points out that it may be said of American blast furnace slags that the principal components are silica, alumina, lime and magnesia, with small quantities of manganese, iron and sulphur, none of which occur in the free state, but in combination with other elements. For example, no free lime or free sulphur is met with in proper blast furnace operation. The average analysis of 269 samples listed in this symposium shows the following values, in per cent: SiO2—36.25; Al203—13.04; MnO—0.79; FeO—0.91; CaO—40.60; MgO—6.37; and sulphur compounds —1.53. In regard to variation of analysis, the preceding data show the statement to be undoubtedly true that there is little variation in the slags from any one furnace, though there may be distinct differences between slags from different localities.

The Uses for Fuller's Earth

This natural earth is used largely in filtering oils but it also is the base for the manufacture of beauty clays, soaps and other widely-used cosmetics.

Mechanism of the Decomposition of Clinker on Prolonged Storage

Dr. Adolf Spengel*

A LARGE amount of clinker, which was made in the rotary kiln, was available to the author. This clinker was kept in storage over a period of seven years and hence had sufficient time to show its ability to resist influences which tended to destroy it.

The greatest portion of the clinker was kept in wooden boxes without paper lining, merely loosely covered, and hence accessible to the atmosphere. A small amount of the clinker was kept for sampling purposes in flasks provided with glass stoppers and hence out of contact with air. The former clinker was subjected to chemical analysis to determine its composition, while the latter clinker was not used in the chemical tests but in the screening tests only.

The clinker was well burnt in the original state, that is before it was stored; it was finely granular and the particles were about the size of peas of three to four millimeters in diameter. The particles were not agglomerated together. It is natural that the access of air to the clinker, while it was kept in storage, should cause extensive decomposition of the mass. Surfaces, which were attacked by the air and which showed clearly the effects of such action were easily visible in pieces of clinker of about five to eight millimeters in diameter. Furthermore, there were agglomerations of material within the mass, which were lighter in color than the rest, indicating that the substance had been changed by the action of the air. Both types of clinker were first analyzed to determine the proportions of various sizes of particles in the mass.

*Tonindustrie Zeitung, 1928, 1939-40.

Results of Screening Tests

	I Access of air to the clinker	II No air in contact with the clinker
Residue on		
Screen, two millimeters	32.1 per cent	69.0 per cent
Screen, one millimeter	13.2 per cent	6.8 per cent
Screen, 0.5 millimeter	21.8 per cent	8.9 per cent
Screen, 0.25 millimeter	19.5 per cent	4.3 per cent
Screen, 0.1 millimeter	5.8 per cent	4.4 per cent
Screen, less than 0.1 millimeter	7.6 per cent	6.6 per cent
	100.0 per cent	100.0 per cent

When air is allowed to come into contact with the mass of clinker, time is afforded for an extensive change to take place within the mass and the quality of the clinker becomes alike in all parts. On the other hand, when no air is allowed to come into contact with the material, the burnt clinker in particles of over two millimeters diameter remain in that state and the finer ingredients are quite uniformly distributed in size according to the screening tests.

The various screen residues and the fines from the screens of a clinker (I) which had been decomposed by the atmosphere were then analyzed. The results of analysis are given in the following tabulations.

The clinker with particles two millimeters in diameter and over corresponds to the undecom-

Complete Analysis of the Screen Residues of Clinker Decomposed by the Air

Ingredient	2 mm.	1 mm.	0.5 mm.	0.25 mm.	0.1 mm.	Less than 0.1 mm.
Silica	20.96	20.31	20.71	20.43	20.30	17.74
Alumina	7.01	6.97	7.42	6.48	6.94	6.16
Fe_2O_3	2.24	2.21	2.23	2.20	2.18	2.25
Lime	67.56	68.31	67.63	68.72	67.38	67.39
Magnesia	0.79	0.73	0.70	0.69	0.72	0.67
SO_3	0.06	0.07	0.06	m0.07	0.06	0.07
H_2O 105 degrees C	0.12	0.11	....	0.02	0.08	0.20
H_2O at 105 deg. +	0.65	0.61	0.52	0.67	1.12	4.82
CO_2 Alkalies	0.61	0.68	0.73	0.72	0.84	0.70
Total	100.00	100.00	100.00	100.00	99.62	100.00
Values Calculated on the Weight of Ignited Substance						
Silica	21.12	20.45	20.81	20.57	20.54	18.63
Alumina	7.06	7.02	7.45	6.53	7.02	6.48
Iron Oxide	2.25	2.22	2.25	2.21	2.20	2.36
Lime	68.08	68.80	67.98	69.19	68.19	70.95
Magnesia	0.79	0.74	0.70	0.72	0.73	0.70
SO_3	0.06	0.07	0.06	0.07	0.06	0.07
Alkalies	0.61	0.79	0.74	0.71	0.90	0.73
Total	99.97	100.09	99.99	100.00	99.64	99.92
Hydraulic Modulus	2.23	2.31	2.22	2.35	2.29	2.58
Silicate Modulus	2.29	2.21	2.14	2.35	2.22	2.10
Alumina/Iron Oxide	3.13	3.16	3.31	2.95	3.19	2.74
	Original substance	Decomposition product Z_1	Residue R_1	Decomposition product Z_2	Residue R_2	Decomposition product Z_3

posed original substance, while the screen residue over one millimeter represents a decomposition product Z_1. The silica content of the latter is decreased, and hence the lime content has increased in the same proportion. The decomposition progresses, so that Z_1 is only a labile intermediate product in the decomposition series, in which the lime is brought more rapidly into action than the silica. It is for this reason that more lime is always found in the decomposition products Z_1, Z_2 and Z_3, namely 68.80 per cent, 69.19 per cent to 70.95 per cent.

Inasmuch as the decomposition, which is caused by weathering, is by no means complete, a final status is therefore not reached and decomposition residues are formed in the addition of decomposition products. They correspond or approach in composition the properties of the clinker of highest quality also with respect to burning. R_1 is accordingly the decomposition residue from Z_1 and the silica content of this residue is naturally higher than that in the decomposition product itself, namely being 20.81 per cent against 20.45 per cent, and the alumina content is also higher in the residue being 7.45 per cent in comparison with 7.02 per cent.

Particles of 0.25 millimeter in diameter and over are represented by the decomposition product Z_2 from the residue R_1. The analysis of this decomposition product shows that it is lower in silica, namely 20.57 per cent against 20.81 per cent, a difference of 0.24 per cent, considerably lower in alumina, namely 6.35 per cent against 7.45 per cent, a difference of 0.92 per cent, and on the other hand higher in lime, namely, 69.19 per cent against 68.80 per cent, a difference of 0.39 per cent.

The decomposition residue R_2, which is obtained from the initially more coarsely-grained Z_2, contains particles 0.1 millimeter in size. The silica content of this decomposition residue remained constant. On the other hand, the alumina content is about half a per cent higher, and the lime content about one per cent less. This difference in lime content between the decomposition product and the screen residue is found in the screen fines, and the lime content of the final product in this series of decompositions finally reached the point, 70.95 per cent. The composition of R_2 is very close to that of R_1.

The decomposition of the clinker took place, accordingly, in the following stages (it is in other words a progressive decomposition).

a). The silica stage: 21.2–20.45–20.81–20.57–20.54–18.63 per cent
Z_1 R_1 Z_2 R_2 Z_3

b). The lime stage: 68.08 68.80 67.98 69.19 68.19 70.95 per cent
Z_1 R_1 Z_2 R_2 Z_3

The lime stage is characteristic of the decomposition process.

Whatever has been said here regarding the decomposition of clinker, holds good as well in various instances in practical work. It may not be superfluous to mention the fact that Portland cement is essentially a water mortar and not an air mortar. A fine film of the cement is subjected to the action of the atmosphere on a piece of concrete and the lime is partially set free, split off and hydrated. Mortar made with dark colored cement becomes lighter with time, and it has been found that a cement which is darker at the outset becomes lighter apparently more quickly than a cement with a somewhat dust-gray color. The darker colored cement contains more lime ferrite and the hydration sets in in this compound and is carried over from it to the lime silicate. The apparent result is a lightening in the color, which is not an inconvenient happening as far as the mere event is concerned. In the case of the coarser ground cement of the last ten years, that is cements that leave behind twenty to twenty-five per cent residue upon the 4900 mesh screen, and are still considered to be finely ground, a layer of dust can be seen upon the surface of old samples that have been exposed to the atmosphere. This is dust of hydrated and decomposed cement (Z_1, Z_2, Z_3 type), from which harder granules of different composition from the standpoint of the aforedescribed residues (R_1 and R_2) are separated. This is the reason why all sorts of paints and chemically active materials are added to the finished cement.

The present investigation shows different fractions can be obtained from highly calcined rotary kiln clinker which is obtained from one and the same raw material. On the other hand, the objection may be raised that the duration of storage was very long and has no counterpart in actual practice. However, it must be replied to this objection that the duration of time affects only the quantity of fine particles and that fractions of different compositions could also be obtained when the cement was stored for only a short time, from two to three weeks. Furthermore, these fractions differ in composition according to the degree to which the cement has been burnt and also according to the proportion of lime in the cement. When the cement is so strongly burnt that it consists of fresh clinker in the Le Chatelier sample and gives a test sample which looks like porcelain, then the danger is less. However, when an effort is made to reduce the burning temperature to a considerable degree and thus to manufacture a cement which is easily ground, then the composition of the raw cement mixture must be maintained with great accuracy within regular proportions in order to produce a cement which will remain constant in volume on use.

An additional example of fractional decomposition of clinker at the upper limits of lime content is found in very large agglomerations of clinker.

(*Continued on Page* 76)

A Reduced Inventory Offers Economic Advantages

By J. R. GAMBLE
Purchasing Agent, Virginia Alberene Corporation, Schuyler, Va.

IN former years, the average executive of a manufacturing plant did not feel at ease unless the inventory was large enough to insure him against almost any unforeseen contingency. Recently, the inventory has been given considerable more attention by a number of concerns, and they have found that there are genuine benefits to be derived by studying it. The excellent service being rendered by the manufacturers and transportation companies, together with the fact that the buyer and seller are assisting each other in every possible way, makes it unnecessary to load up the stock room with an excessive amount of supplies and at the same time tie up a lot of perfectly good money. In the bank, this money can be used to much better advantage. For instance, bills may be paid promptly and there is also the opportunity to increase net earnings by taking advantage of the savings effected by discounting invoices.

Indeed, it is very often advantageous to purchase certain commodities in large or carload quantities, but due consideration must be given to the length of time required to consume such articles for the reason that frequently the price differential is not sufficiently great to offset the interest on the money invested. Again, there are times when it is not only advisable but economical to store material in excess of normal requirements to anticipate price advances, strikes affecting an entire industry, or the shutdown of a plant which you are depending upon as a source of supply for a special article used by your company. Occasionally, it is necessary to order in quantities that will eliminate extras for quantity, and in this connection it is well to remember the fact that no saving is effected when valuable capital is invested in slow moving stock.

It is rather easy for the purchasing agent to buy and carry in stock a large quantity of supplies; it is unsafe to carry an inadequate amount, but to be entirely out of some particular item at a time when it is badly needed will quite often result in serious interference with plant operations and greatly handicap production, more especially when the article happens to be of a special nature and cannot be secured from stock but has to be manufactured. To have the right goods on hand at the right price and in the proper quantity, however, requires careful study and the purchasing agent, together with his staff, must be constantly on the job. The much discussed policy of "hand to mouth" buying is being widely practiced and evidently working out satisfactorily. This in itself will naturally tend to reduce the inventory, but we will endeavor to point out some other important factors.

When the writer was placed in charge of the purchasing for his firm, the value of the store-room inventory was written in six figures. It was apparent that the amount was excessive and we decided to give the inventory close attention in an effort to reduce it to a safe and sane figure. That we were somewhat successful is shown by the fact that within a period of four years, in face of continual plant expansion and increased production, we have reduced the value of our stores by 50 per cent. The former large stock is not missed except for the fact that there is more space available in the stock room and the physical inventory is taken more quickly and with greater accuracy.

The first and probably the most important step was the installation of a visible stock record system and perpetual inventory. Receipts are recorded as soon as they have been checked and found to conform to specifications. Prices are also posted on the cards. A properly signed requisition is issued for all material withdrawn from the stock room and deductions made from the cards daily. A minimum quantity to be carried is agreed upon and established for each item, of which there are about 2,500, and when an article reaches or nearly reaches the minimum, it is placed on the want or short list. Such a list is handed to the purchasing agent daily. It is, of course, necessary to revise some minimums from time to time. The fact that the records show the quantity consumed over any period of time makes it a simple matter to regulate purchases. Recording purchases on the cards and consulting them before buying precludes the possibility of purchasing material already on hand or on order, and prevents overstocking.

Lists are compiled of the slow moving and obsolescent stock and handed to the various foremen or heads of departments with the request that they endeavor to make use of these supplies whenever it is practicable. This procedure results in a very noticeable decrease.

Items considered obsolete with us were segregated and a number of them sold to other concerns. In some cases, it was found possible to make them suitable for our use by slight alterations.

Owing to changes in some of our equipment, certain spare parts were of no service to us, although they were standard with the makers of the ma-

chines. Permission was requested and granted to return them for exchange or credit.

In our business, particularly the quarrying end, it is essential that we carry quite a large stock of repair parts, some of which are very expensive. By purchasing some of these in the form of rough castings and forgings and machining them in our shops, we not only reduce the value of our stores but save considerable money as well. Dimensional simplification, by which we eliminated unnecessary variety in sizes and style, was also helpful.

Decomposition of Clinker

(*Continued from Page* 74)

Decomposition is accelerated in this instance by the pressure of the mass and the heat in its interior. The finer fractions and the dust gradually flow down between the coarser particles to reach the bottom of the mass, with the result that a separation between the two takes place within time. Hence, only the finest quality of clinker reaches the grinding mill. The cement that is obtained under these conditions is therefore of high strength and perfect constancy of volume. Then irregularities are found, particularly in the tendency of the cement to set rapidly and furthermore in the resistance to tension and in the cooking test. There is apparently no explanation of this condition, for the clinker was free from all fault at the beginning. The question then arises as to the wisdom of burning the cement more strongly. When this is done, it is found that the same condition again arises, until the remainder of the clinker agglomerate remains and is slowly worked up. The cause of the variation must be looked for in the concentration of the high lime fraction at the bottom. This is the reason why clinker storage houses of considerable height must be carefully used, for in such houses the separation of the clinker into different layers, as indicated above, is favored when the clinker is allowed to remain in storage for a long time. In spite of the fact that the original raw materials are mixed together with great care so that a uniform raw cement mixture is obtained, nevertheless it is necessary to mix together the cement as well, so as to avoid troublesome variations in the strength of the finished cement, which shows a variation of plus or minus 120 kilograms in resistance to compression in spite of the greatest care.

It therefore follows that long storage of the clinker is not an advantage under all sorts of circumstances. While the ease with which the cement is ground is enhanced by long storage of the clinker, nevertheless certain irregularities may at times be found in the quality of the finished cement.

Material Service Launches Boat

(*Continued from Page* 48)

The party of fifteen well known Chicagoans who went to Sturgeon Bay to participate in the launching of the new craft were snowbound for twenty-eight hours in a northern Wisconsin blizzard while homeward bound. In this group were Mr. and Mrs. Leathem D. Smith, Mr. and Mrs. Irving Crown, Mrs. Henry MacFarland, Major and Mrs. R. W. Putnam, State Senator John Dailey, T. J. Ryan, Si Greiver, Capt. C. A. Holt, who will command the boat, and Chicago newspapermen, photographers and news reel men.

Asphalt Association Expands Its Program

LeRoy M. Law of the New Orleans Refining Company, New Orleans, has been elected president of The Asphalt Association, the national trade organization of the asphalt industry. Other officers elected were: W. H. Kershaw, the Texas Company, New York, and C. W. Bayliss, Barber Asphalt Company, Philadelphia, vice-presidents; Fisher Jones, Mexican Petroleum Corporation, New York, treasurer, and J. E. Pennybacker, New York, secretary and general manager. J. S. Helm, Standard Oil Company of New Jersey, the retiring president, heads the new executive committee which, besides Messrs. Law, Kershaw and Jones, includes J. A. Feely, Atlantic Refining Company, Philadelphia. The board of directors includes Messrs. Law, Bayliss, Kershaw, Helm, Jones and Feely, C. C. Lakin, Standard Oil Company of Indiana; F. A. Hogan, Imperial Oil Company, Ltd., Canada; H. C. Ehrenfels, Standard Oil Company of Louisiana; E. J. Morrison, president, Hastings Pavement Company, and B. L. Boye, Standard Oil Company of New York.

The association has entered into official co-operation with the United States Bureau of Public Roads in a great research program, looking to the improvement at low cost of the vast mileage of secondary or farm-service roads. Also, limitations which had previously confined the work of the association to paving asphalts have been eliminated, and it is contemplated that it will function for the industry over the whole range of the economic uses of asphalt. Airport improvement will receive thorough attention in the new program, and also a technical committee to work out the problems of research, standardization and simplification of grades in co-operation with the various governmental and scientific bodies was created.

Palm Beach and Miami, Fla.; St. Louis and Kansas City, Mo., and Richmond, Va., are among the cities under consideration for the next meeting.

Accounting for Packages or Containers

By J. J. BERLINER

ACCOUNTING for returnable packages or containers presents four distinct features: 1. There is the liability to the customer for the return to him of the amount charged for the package, when it is billed out to him with merchandise contained therein. 2. There is the asset of the actual value of the package in the hands of the customer to be returned. 3. There is the loss or expense of maintenance of the package, and the loss from wear and breakage or the value of the package worn out and discarded or dumped. 4. There is the element of profit on those packages which are never returned, but are broken or retained by the consumer.

Taking these in the order named, we have first the liability of one large factory that was forced to the wall by the redemption of returnable packages during a panic. The records did not include the liability and the company was unprepared to meet the sudden call for the redemption of outstanding obligations of this character, which the tightness of money caused people to look up and convert into cash.

In order to handle this item properly it is necessary to start at the time the package is billed out to the customer (see form 1), and separate it from the merchandise therein. From the sales sheet it is posted to the customers' or sales ledger (form 2) and it is so recorded there that one may at any time ascertain at a glance whether the customer is indebted for merchandise or owes for returnable packages.

The next step is the credit memo. covering the return of these packages (form 3) which, like the sales sheet, is posted direct to the customers' or sales ledgers. The total of packages charged to customers is credited monthly to the outstanding returnable package account in the general ledger, and this account is charged monthly with the packages redeemed both from the total of the column in the cash book for those paid for in cash, and the total of the credit memos for those credited through these records. The difference in the outstanding returnable package account, if handled in this manner, will at all times show the amount in dollars and cents, of packages outstanding.

The keeping of the returnable package separate from the merchandise is important, not only for proper accounting and to ascertain the true condition of accounts receivable, but it is also important in arriving at proper commissions due salesmen, as no factory or business can properly pay a commission on that part of the sales which nets them no profit and is only a necessary expense in their operation.

The second factor is the asset consisting of the value of the package to be redeemed.

As in almost every case where a returnable container is used in trade, the price charged for the container exceeds its actual cost, this asset cannot equal the amount charged. In many cases the original cost is not more than sixty or seventy per cent of the charge and its value as an asset is less than its original cost for, by use, it has become second-hand and requires expense in labor and often in material before it can again be fit for use. Therefore, when considering these outstanding packages as an asset, they can be properly so taken only at a value not to exceed their cash second-hand worth if returned and in stock. This asset only appears on the books, of course, at inventory periods, and is handled as shown later.

The third question is maintenance or loss.

The cost of maintenance is handled as would be any other expense account in the records and is covered by an account known as maintenance. This includes all labor and material used in cleaning or repairing and preparing returned containers for use, but does not cover the value of containers discarded or dumped. Worn out or discarded containers are charged to profit and loss and credited to returnable packages account.

Heading to be in usual form for sales sheets

Date		Articles	Mdse.		Pkgs.		Total	

Form No. 1 Sales Sheet, size to be made to suit business.

Heading to be in usual form for sales ledger sheets

DEBIT						CREDIT				
Date			Mdse.	Pkgs.	Total	Total	Mdse	Pkgs.		Date

Form No. 2 Customers' Ledger, size to be made to suit business.

Heading to be in usual form for credit memos.

Date		Articles	Mdse.		Pkgs.		Total	

Form No. 3, Credit Memos., size to be made to suit business.

It will be noted that a new account is here introduced, "returnable packages account." This account has nothing to do with the account known as "outstanding returnable packages," mentioned above. Returnable packages account is started with the inventory of packages on hand in the factory or warehouse as the inventory of the actual value of returnable packages in the hands of customers. To this account is charged during the year the purchases (at cost) of new containers. It is credited with containers discarded or dumped. In other words, the returnable package account is the asset account and the outstanding returnable packages account is the liability account. These two, with the maintenance of returnable packages account, complete the accounting record of the returnable package in all cases where the container is charged for as a part of the selling price of the merchandise; but they do not in any way cover the method necessary or desirable where the value of the container is not included in the selling price or is repurchased by the manufacturer, but is simply kept track of and collected by the distributor, as is the case in a few branches of trade.

This now brings us to the fourth and last element, that of profit on containers broken or retained by the consumer.

While this profit does undoubtedly exist, the determination of its exact amount is extremely difficult, if not impossible, and the only practical method is to determine by experience the percentage of the containers sold which are never returned, but which are paid for by customers and whose age preclude their being returned for credit. In arriving at this percentage, care should be used to be conservative in order that the liability may not be reduced below its real amount. Once ascertained, this profit is credited to profit and loss and charged to outstanding returnable packages account; but this must be done, of course, before the inventory of containers in hands of customers is made up, as that also is calculated on a percentage basis and governed by the balance shown on the outstanding returnable package account.

There is another important feature in the proper handling of returnable packages which has not been discussed and that is relative to accounts receivable. Unless form 2 or something similar is used for a customers or sales ledger, it will be very difficult to separate the real asset in the accounts receivable from the amount due for returnable packages and, in drawing up the statement, the accountant is likely to deceive the banker or stockholder who receives his report as to the real condition of the business under examination, and thereby not only to hurt his own reputation, but to injure the profession as a whole.

Batch Weighing Displaces Volumetric Measuring

With the introduction of the centralized concrete mixing station as one of the most important developments in concrete construction comes also the definite demand for more accuracy in measuring the raw materials that go into the making of the concrete. Undoubtedly one of the fundamentals justifying the departure from the old-time method of mixing concrete at the point of construction is the constant demand for improving the uniformity and quality of concrete.

With the coming of the centralized mixing plant or station comes another urge to get away from the volumetric measurements of aggregates and cement in making concrete. While volumetric measurement is to some extent inaccurate in measuring all aggregates, it is particularly so in the case of sands because of the variation in the bulking of sands due to varying moisture contents. This bulking may run as high as 40 per cent with some moisture contents and under certain conditions of handling.

The condition of handling has a greater effect than is generally accepted. If sand is allowed to flow slowly for a short distance, as from a bunker into a container, the bulking will be relatively high; whereas, the same sand, fed in a heavier stream of less slope and allowed to drop a greater distance, will have a tendency to pack to some extent and bulk less. The volume resulting in both cases will mean a variation of actual quantity of the material.

The use of scales eliminates this entirely. The slight variation due to the actual weight of inherent moisture can be easily determined and the proper correction made. There are various appeals made by the manufacturers of scales, dial or otherwise, for their particular product, hence we do not wish to consider at this time the merits of various batch-weighing devices. But that batches should be weighed is becoming more evident as the demand for uniform and quality concrete increases.

V-BELT DRIVES COMING INTO WIDESPREAD USE

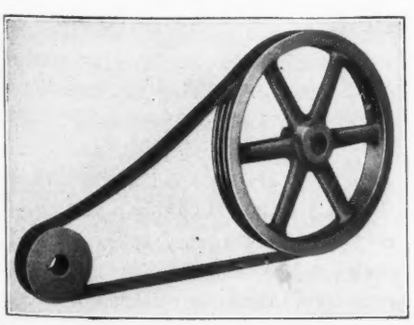
V-Belt Drive Makes Possible Use of Short Centers With Higher Speed Motors, Requires No Lubrication and Operates Silently Without Vibration

IN THE last few years there has been a considerable development in the use of elastic V-shaped belts in multiple instead of ordinary flat belt type of drive or in place of chain drives. Such drives are applicable to almost any type of service and their use has solved many baffling power transmission problems.

This type of drive has a number of interesting advantages as compared with the ordinary flat belt drive and in comparison with direct connection of the motor to the driven machine. In the first place very short centers. are possible so that minimum floor space is required for a drive. It is also possible to increase the speed ratios and to use higher speed motors than is the case with the ordinary flat belt drive, even where some type of idler pulley device is used or as compared with direct connection. This reduces the initial cost of the motor installation.

The efficiency of the V-belt drive has been shown on numerous tests to be 98 per cent or better. This compares very favorably with the best practice obtained with the chain drive and is superior to the efficiency obtained with flat belt drives. The V-belt has flexibility and the driven machine is thereby protected against breakage by sudden stoppage or shocks. It operates silently and eliminates vibration. No belt dressing or lubrication of any kind is required for this type of drive. The V-belt drive, therefore, requires practically no attention and the maintenance cost is low.

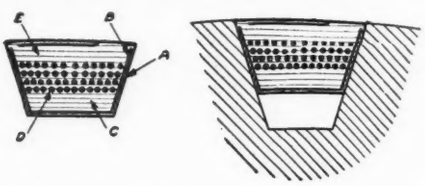
With a drive of the V-belt type bearing pressures are greatly reduced. This is made possible by the fact that much higher belt speeds can be used and by the fact that due to the wedging action of the belts in the grooves there is practically no tension on the return side of the V-belt. The total belt tension in the V-belt drive while running is practically equal to the driving tension whereas with a flat belt the total tension while running is anywhere from two to six times the driving tension.



A set of sheaves and belts for a typical V-belt drive.

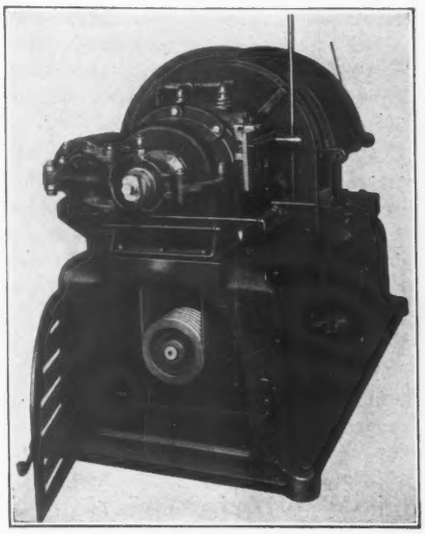
V-belts are available for transmitting power from a fraction of a horsepower up to two hundred and more horsepower and they may be used for either reducing or increasing speeds. In nearly all cases it is possible to secure them for any required center distances. This is made possible by the large selection of standard belt lengths in which these endless belts are available.

One of the most recent developments in V-belt drives is known as the Flex-Mor drive which is a product of Fairbanks, Morse and Company. The new drive is the result of numerous field and dynamometer tests to determine the factors of belt angles, slippage, the life of belts of various constructions, character of the various materials entering into the drive, and power capacity.



Drive belts are built up of duck, shown at A and B, Special compounded rubber (C and E) and layers of cords, shown at D.

The belts which are used with this drive are built up of an outer belt jacket of duck which has been treated with rubber to improve its wearing qualities. As shown in an accompanying illustration this jacket consists of two layers of duck enclosing a core made up of a layer of rubber, several layers of rubber-embedded cords, and another layer of rubber above the cords. The layer of rubber below the cords is specially compounded to withstand repeated compression, while the layer of rubber above the cords is specially compounded to withstand repeated tension. The rubber-embedded cords are laid at the neutral axis of the belt where there is the least tension or compression. These cords are made of long staple cotton and the construction is quite similar to that which is used in cord tires. The various elements of the belt are assembled in the mold and vulcanized together into a unified structure.



A short center vertical drive, one of the most difficult belt-drive problems, is solved with multiple V-belts.

The sheaves are made of semi-steel and have been designed with particular reference to the angle and depth of the grooves so that the belt slippage is a minimum. At the same time the relation between the angles of the belt sides and the grooves are such that the belt makes a gradual contact with the grooves as it bends around the sheaves. Due to the wedging action of the belts in the grooves and to their inherent elastic qualities there is no sudden grabbing of the load and sudden shocks to the driving and driven machines are eliminated.

Mechanism of Decomposition Of Rotary Kiln Clinker On Long Storing

Clinker after 7 years of storage in contact with the air underwent spontaneous pulverization, not shown by similar clinker in a bottle. The former was separated by sieves into fractions. On analysis it was found that as the change progressed, the decomposed fractions contained more lime and less SiO_2 than the original. The larger, more poorly burned clinker balls suffered much more than the hard-burned pea-sized pieces. Therefore hard burning tends to prevent this decomposition. Adolf Spengel. (Tonind. Ztg. *52*, 1939-40 (1928). C. A.

Important Merger Completed

Thirty-two large manufacturers and distributors of tractors, industrial equipment and farm implements have announced final details of their organizing as the United Tractor and Equipment Corporation. The combined assets of the companies in this cooperative manufacturing and marketing movement are about $125,000,000.

A full line of industrial and farm tractor equipment designed to be operated with their tractor, will be marketed through several hundred dealers in the United States and Canada, and the fifteen manufacturers and seventeen distributors allied with the new corporation.

Milton W. Anderson, president and general manager, states that the purpose in mind when organizing this new company was to unite the forces of commerce, manufacture and distribution, and to build and market a full line of equipment and their tractor at the lowest cost consistent with high quality. Knowing the requirements of the field, anticipating and pooling buying of materials, charting manufacturing schedules long periods in advance, and eliminating unnecessary duplication of sales efforts and costs enables the new organization to cut their selling prices to a minimum.

The United Corporation was made possible, it is declared, through Henry Ford's withdrawal from the American tractor field. Henry Ford was undoubtedly the greatest manufacturer in point of volume that the industry has seen. He has built close to 700,000 Fordson tractors. Some of the men most directly responsible for Mr. Ford's success, through their designing, manufacturing and distributing of the equipment that went with the Fordson, are with the new organization. Mr. Anderson, himself an engineer, left his distributing business in San Francisco when Fordsons could not be had, engaged engineers to design a tractor that would fit into the manufacturing and selling organizations that have been credited with producing 90% of the Fordson business, and subjected the new machine to the criticisms of the concerns that were to make equipment for use with it.

The design was then presented to H. C. Morritt, general manager of Allis-Chalmers' tractor division, active in the tractor field since the building of the first machine, and acknowledged one of the outstanding authorities on tractors and tractor equipment. The Allis-Chalmers company, with its corps of more than 300 engineers, endorsed and supported the new idea of Mr. Anderson's. Their engineering and manufacturing resources guided by Mr. Merritt and Mr. Anderson, soon perfected what they term as the most modern tractor at the lowest price ever built.

In low gear the tractor is guaranteed to pull 3,500 pounds and in high gear it will pull 2,500 pounds. Dynamometer tests show 25 horsepower on the drawbar and 35 horsepower on the belt pulley. Its speed is easily controlled and regulated. In first gear giving a speed of 2.35 miles per hour, 3.32 miles per hour in second gear, 5.00 miles per hour in third gear, 10.00 miles per hour in fourth gear, and 2.69 miles per hour in reverse gear. The net weight of the tractor is 3,950 pounds. The ground clearance is 11 inches.

Enrolled in the corporation membership are these manufacturers:

Allis-Chalmers Manufacturing Company, tractors, the Wehr Company, road building machinery and rubber-tired industrial wheels, and the Trackson Company, logging hitches, full crawler attachments, cranes, bulldozers and backfillers, all of Milwaukee, Wis.; Brookville Locomotive Company, gasoline locomotives, Brookville, Pa.; Dorsey Brothers, stump pullers and land clearing equipment, Elba, Ala.; Hughes-Keenan Company, "Iron Mule" self-contained dump tractors, and the Roderick Lean Manufacturing Company, field type disc harrows, Mansfield, O.; C. H. Turner Manufacturing Company, saw mill equipment and cordwood saws, Statesville, N. C.; the Perry Company, scrapers, Perry, O.; Muskogee Iron Works, double and single-drum hoists and oil field equipment, Muskogee, Okla.; Brenneis Manufacturing Company, orchard harrows, Los Angeles, Calif.; Ferguson Manufacturing Company, wheelless plows, Evansville, Ind.; Universal Power Shovel Company, power shovels, Detroit, Mich.; Athens Plow Company trailing and side disc plows, Athens, Tenn.; Moline Implement Company, general line of agricultural implements, Moline, Ill.

Distributors in the corporation are the Howard Cooper Corporation, Portland, Ore.; O. R. Peterson Company, Inc., San Francisco; B. Hayman Company, Inc., Los Angeles; F. D. Equipment Company, Dallas, Texas; Thompson Automobile & Machinery Company, New Orleans, La.; Dealers' Equipment and Implement Company, Memphis, Tenn.; Truck Tractor Equipment Company, Columbus, O.; Motor Power Equipment Company, St. Paul, Minn.; W. B. May, Inc., Buffalo, N. Y.; Cunningham-Ortmeyer Company, Milwaukee, Wis.; C. V. Ruble, Kansas City, Mo.; C. H. Turner Mfg. Company, Statesville, N. C.; John M. Brant, Bushnell, Ill.; Dealers' Equipment Company, Oklahoma City; C. W. Bull Equipment Company, Houston, Texas; British Columbia Tractor Equipment, Ltd., Vancouver, B. C.; George A. Clark, Toronto, Ont.

The Agricultural Bond and Credit Corporation of Chicago, a financing house dealing exclusively in tractor and equipment paper, also is a member.

The officers of the Corporation are: Milton W. Anderson, president and general manager; W. B. May, of W. B. May, Inc., Buffalo, N. Y., vice president; E. R. Wehr, the Wehr Company, Milwaukee, secretary-treasurer; Walter Stiemke, the Trackson Company, Milwaukee, assistant secretary-treasurer.

Directors include President Anderson, Walter Stiemke, E. R. Wehr, W. B. May and H. C. Merritt, Allis-Chalmers Mfg. Company, Milwaukee; Arthur S. Hughes, Hughes-Keenan Company, Mansfield, O.; Robert Lea, Moline Implement Company, Moline, Ill.; A. W. Logan, Motor Power Equipment Company, St. Paul; B. C. Thompson, Thompson Auto and Machinery Company, New Orleans.

Committee chairmen are: Sales Promotion and Advertising, Walter Stiemke; Manufacturers, H. C. Merritt; Territorial and Membership, K. J. Miller, Truck Tractor Equipment Company, Columbus, O.; Adjustment, J. W. Ferris, F. D. Equipment Company, Dallas, Texas; Export, C. H. Turner, Turner Mfg. Co., Statesville, N. C.; Finance, A. G. Stratton, Agricultural Bond and Credit Corporation, Chicago.

Statistics of Cement

The ratio of the operations to the capacity of the American portland cement industry during the month of February was 44.8 per cent, according to figures released today by the Bureau of Mines of the Department of Commerce. During the month 8,522,000 barrels were produced, 5,448,000 barrels were shipped, and there were in stocks on hand at the end of the month 29,871,000 barrels. Production in February, 1929, was 3.1 per cent less, and shipments 17.0 per cent less than in February 1928. Stocks at the mills were 9.2 per cent higher than a year ago.

Feats of Heroism and Outstanding Safety Achievements Recognized by Holmes Safety Association

The humanitarian side of the Nation's great mineral industries was emphasized in the awarding by the Joseph A. Holmes Safety Association, at the annual meeting of its officials just held in Washington, of medals, buttons, and diplomas to individuals who had performed notably courageous feats in rescuing or attempting to rescue comrades entrapped underground in time of accident or disaster. Diplomas were awarded to individual mine officials and to mines which have achieved records of long-continued operation with remarkably small numbers of accidents. An interesting feature in the hero awards is that in a number of cases the miners were Mexicans or Indians employed in the metal mines of Arizona. In the cases of some of the mines recognized, the production of millions of tons of ore or coal, over periods of several years, had been achieved without the loss of a single life. The entire plant of one large cement company had been operated for almost three years without even a lost-time accident.

Among the many medals, certificates, and other marks of honor, a certificate was given the Cowell Portland Cement Company, Cowell, California, for having worked its entire plant since May 11, 1926, to February 25, 1929, a total of 1,758,065½ manhours, without a lost-time accident. The quarry of this plant had its last lost-time accident on August 14, 1925, and has since worked 415,354½ manhours.

The following-named organizations, holding membership in the Joseph A. Holmes Safety Association, were represented at the meeting; American Association for the Advancement of Science; American Federation of Labor; American Institute of Mining and Metallurgical Engineers; American Mining Congress; American Society of Mechanical Engineers; Geological Society of America; International Railway Fuel Association; Mine Inspectors Institute of America; National Academy of Sciences; Society for the Promotion of Engineering Education; United Mine Workers of America; National Coal Association; Coal Mining Institute of America; Personnel Research Federation; United States Bureau of Mines; and the United States Geological Survey.

Holmes Safety Association representatives from the Alabama Council, Birmingham, Alabama; the J. J. Forbes Council, Uniontown, Pennsylvania; the Stanacola Chapter, Baton Rouge, Louisiana; and the Pierce Chapter, Pierce, Florida, were present.

Increased Non-Metallic Activity in North Carolina

In a review recently issued by the North Carolina Department of Conservation and Development, State Geologist H. J. Bryan discusses the 1928 mining and quarrying conditions and speaks particularly of the kaolin, feldspar, mica, and flint productions, as follows:

"One of the chief developments in the kaolin industry was the introduction of a new process of washing, introduced by the Norman G. Smith Company of Spruce Pine. Clays produced by this method are said to be superior to those by others. The same company is credited with evolving a new process for the recovery of scrap mica from clays.

"In the past two years, the grinding capacity of feldspar mills has been increased from 180 tons to 410 tons daily. Four plants are now in operation, with the fifth proposed for the early part of this year. Production of feldspar for 1928 in North Carolina is estimated at 70 per cent of that of the entire country, and for 1927 it was 100,756 tons, the highest on record for North Carolina.

"For years North Carolina has been the leading mica producing state of the union, but for the last few years it has been steadily decreasing because of foreign competition, most of which comes from India, South Africa and France. He said that foreign mica can be shipped to mills at Spruce Pine cheaper than it can be mined in that district.

"Quartz or 'flint' production has been steadily increasing over a period of several years. If white-ware plants, two or three of which are now contemplated, are located in North Carolina, quartz production will be still further developed."

Why Rentals Are High

According to a recent report by the Indiana Limestone Association, sixty-one dollars per capita was invested in the United States last year in new buildings—business, residential, and public.

"This average investment is a 90 per cent increase over that of nine years ago, the beginning of the post-war building activity," says A. E. Dickinson, president. "In 1920, the per capita investment was $32. The $4,000,000,000 spent annually for construction materials is a balance wheel for industry in general. It means other billions for labor.

"There is no danger of the construction supply surpassing demand as long as America's pocketbook is sufficiently supplied to enjoy the higher plane of living of the last few years. Buildings wear out, become obsolete and are replaced with modern, more convenient structures. Generally speaking, the average life of a building is thirty to forty years."

The Safety Director His Qualifications

"A sincere personal interest in human relations, enthusiasm, and ability to become a friend and leader of men have proven paramount qualifications of the successful safety director," according to Industrial Safety booklet No. 3, just issued by the Policyholders Service Bureau of the Metropolitan Life Insurance Company.

Addressed primarily to the chief operating official, it deals with the need for competent direction of safety activities in both large and small organizations and outlines the qualifications, duties and functions of the safety director.

This booklet is one of the most valuable in a series presenting the basic principles of successful industrial safety work. The two previous releases in this series are: "Getting Results From Safety Work," and "Getting Facts About Accidents." Copies of any or all of the series may be obtained by those interested in accident prevention by addressing the Policyholders Service Bureau, Metropolitan Life Insurance Company.

Gypsum Proves a Valuable Sanitary Agent

Here is a new market for gypsum. Poultrymen have found agricultural gypsum a valuable addition to their poultry plant operations. It is an excellent sanitary agent. After the droppings have been removed from beneath the roosts each day, a small amount of gypsum is scattered over the floor. This makes the poultry house appear cleaner and it absorbs any moisture which may be on the floor. It prevents the foul ammonia odors so common in many poultry houses.

Gypsum will not irritate the throats and eyes of the birds. And the best part of it is that the cost is low. The gypsum scraped off with each day's droppings is valuable as a fertilizer. Gypsum thus proves valuable as a deodorant, a step towards sanitation, and an asset for fertilizing purposes.

Distribution of Cement

The following figures show shipments from Portland cement mills distributed among the states to which cement was shipped during December, 1927 and 1928, and January, 1928 and 1929.

Portland cement shipped from mills into States, in December, 1927 and 1928, and January, 1928 and 1929, in barrels

Shipped to—	December		January	
	1927	1928	1928	1929
Alabama	154,744	123,522	235,233	125,356
Alaska	132	132	396	132
Arizona	59,318	42,385	82,184	55,771
Arkansas	57,068	69,131	62,143	47,957
California	824,570	859,234	1,030,965	950,884
Colorado	26,601	24,317	32,389	27,709
Connecticut	86,509	97,419	74,600	57,087
Delaware	11,926	14,122	13,077	10,183
District of Columbia	35,714	53,681	30,341	60,476
Florida	113,291	97,857	108,750	93,827
Georgia	82,378	98,912	113,857	92,494
Hawaii	15,380	20,659	20,290	21,829
Idaho	4,441	5,533	6,408	3,266
Illinois	354,542	469,527	354,763	211,984
Indiana	95,766	133,155	88,411	65,421
Iowa	23,951	34,397	30,488	17,701
Kansas	54,211	93,623	78,460	43,008
Kentucky	54,727	63,567	54,991	33,118
Louisiana	87,776	74,396	94,929	96,054
Maine	10,808	11,944	12,487	10,011
Maryland	79,376	90,219	87,650	60,058
Massachisetts	115,909	136,456	104,382	85,539
Michigan	288,329	368,112	267,206	247,190
Minnesota	31,326	52,903	50,480	30,494
Mississippi	54,595	90,745	57,528	83,044
Missouri	122,327	193,691	146,411	92,089
Montana	7,359	11,889	8,289	3,525
Nebraska	22,265	32,472	26,815	16,113
Nevada	7,151	4,029	3,293	6,703
New Hampshire	17,676	19,477	17,647	17,988
New Jersey	334,897	383,075	318,204	238,270
New Mexico	8,557	15,068	12,861	30,915
New York	972,156	1,150,410	800,428	746,897
North Carolina	112,711	148,245	135,292	108,492
North Dakota	1,503	4,237	2,102	2,020
Ohio	265,267	351,927	265,048	250,972
Oklahoma	166,309	220,102	201,422	153,718
Oregon	51,020	39,466	37,133	33,364
Pennsylvania	482,928	539,402	441,419	378,421
Porto Rico	0	0	0	500
Rhode Island	23,034	43,188	25,325	16,956
South Carolina	76,009	92,059	102,178	96,379
South Dakota	1,570	6,722	5,988	4,414
Tennessee	96,305	138,090	88,966	96,513
Texas	320,201	379,921	405,245	481,774
Utah	13,642	15,132	9,575	13,185
Vermont	12,675	11,026	11,363	8,794
Virginia	76,722	97,175	91,941	86,620
Washington	94,981	132,183	90,604	111,351
West Virginia	42,153	46,917	39,992	33,367
Wisconsin	89,645	114,658	74,881	57,769
Wyoming	7,676	4,428	5,262	4,216
Unspecified	405	502	32,918	12,410
	6,150,532	7,321,439	6,493,010	5,634,328
Foreign Countries	49,468	62,561	47,990	72,672
Total shipped from cement plants	6,200,000	7,384,000	6,541,000	5,707,000

Production, shipments, and stocks of finished Portland cement, by months, in 1928 and 1929. (In thousands of barrels)

Month	Production		Shipments		Stocks at end of month	
	1928	1929	1928	1929	1928	1929
January	9,768	a9,881	6,541	a5,707	25,116	a26,797
February	8,797	8,522	6,563	5,448	27,349	29,871
March	10,223	.....	10,135	.....	27,445	.....
April	13,468	.....	13,307	.....	27,627	.....
May	17,308	.....	18,986	.....	25,984	.....
June	17,497	.....	18,421	.....	25,029	.....
July	17,474	.....	19,901	.....	22,580	.....
August	18,759	.....	21,970	.....	19,374	.....
September	17,884	.....	20,460	.....	16,799	.....
October	17,533	.....	19,836	.....	14,579	.....
November	15,068	.....	11,951	.....	17,769	.....
December	12,189	.....	7,384	.....	22,650	.....
	175,968	.....	175,455	.....	.....	.....

Production and stocks of clinker (unground cement), by districts, in February, 1928 and 1929. (In thousands of barrels)

District	Production		Stocks at end of month	
	1928	1929	1928	1929
Eastern Pa., N. J. and Md	2,613	2,899	1,645	2,063
New York and Maine	552	479	855	1,153
Ohio, Western Pa. and W. Va	1,156	1,102	1,607	1,469
Michigan	664	733	1,525	1,089
Wis., Ill., Ind. and Ky	1,787	1,630	1,727	1,769
Va., Tenn., Ala., Ga., Fla. and La	1,140	1,177	1,025	1,296
Eastern Mo., Ia., Minn., and S. Dak	1,005	923	866	817
Western Mo., Neb., Kans. and Okla	621	648	535	696
Texas	455	430	145	182
Colo., Mont. and Utah	136	84	385	405
California	1,004	930	1,392	1,082
Ore. and Wash	230	220	530	419
	11,363	11,255	12,237	12,440

Cement Statistics for February, 1929

The Portland cement industry in February, 1929, produced 8,522,000 barrels, shipped 5,448,000 barrels from the mills, and had in stock at the end of the month 29,871,000 barrels, according to the United States Bureau of Mines, Department of Commerce. The production of Portland cement in February, 1929, showed a decrease of 3.1 per cent and shipments a decrease of 17.0 per cent, as compared with February, 1928. Portland cement stocks at the mills were 9.2 per cent higher than a year ago.

The statistics here presented are compiled from reports for February from all manufacturing plants except two for which estimates have been included in lieu of actual returns.

In the following statement of relation of production to capacity the total output of finished cement is compared with the estimated capacity of 160 plants at the close of February, 1929, and of 155 plants at the close of February, 1928. In addition to the capacity of the new plants which began operating during the twelve months ended February 28, 1929, the estimates include increased capacity due to extensions and improvements at old plants during the period.

Recent Patents

The following patents of interest to readers of PIT AND QUARRY recently were issued from the United States Patent Office. Copies thereof may be obtained from R. E. Burnham, patent and trade-mark attorney, Continental Trust Building, Washington, D. C., at the rate of 20c each. State number of patent and name of inventor when ordering.

1,702,248. Pulverizing mill. Joe Crites, Evanston, Ill., assignor to Raymond Bros. Impact Pulverizer Co., Chicago, Ill.

1,702,327. Dump-car locking mechanism. Ernest R. Viberg and Alfonz L. Linderblad, Montreal, P. Q.

1,702,563. Loading-boom. Alfred B. Esseltine, Chicago, Ill., assignor to Goodman Mfg. Co., same place.

1,702,570. Apparatus for handling loose materials. Charles F. Poole, Chicago, Ill., assignor to Goodman Mfg. Co., same place.

1,703,063. Excavator. Raymond Dorward, Indianapolis, Ind., assignor to Insley Mfg. Co.

1,703,071. Material-handling system. Robert H. Beaumont, Radnor, Pa., assignor to R. H. Beaumont Co., Philadelphia, Pa.

1,703,600. Material loading and handling machinery. Johann C. Sell, Springwells, Mich.

1,703,726. Screen. Thomas J. Davis, Duquesne, Pa.

1,703,864. Method of producing compositions containing mineral aggregates. Craig R. Arnold, Dahlonega, Ga.

1,703,956. Means for preparing molding sand. George F. Royer, Wilkes-Barre, Pa.

1,704,115. Apparatus for washing and separating sand and gravel. Horace G. Young, New York, N. Y.

1,704,268. Art of making cementitious mixtures. William M. Venable, Pittsburgh, Pa., assignor to Blaw-Knox Co.

1,704,335. Gyratory comminutor. Ray C. Newhouse, Wauwatosa, Wis., assignor to Allis-Chalmers Mfg. Co., Milwaukee, Wis.

1,704,425. Ejector for excavator-dippers. Hermann Bruning, St. Paul, Minn., assignor to American Hoist & Derrick Co., same place.

1,704,556. Aerial bucket. William R. Coleman, Birmingham, Ala.

1,704,757. Pulverizing-mill. John Mead, Jr., Detroit, Mich.

1,704,941. Cribbing. John S. Hobson, Chicago, Ill., and John S. Huntoon, Detroit, Mich., assignors to Massey Concrete Products Co., Chicago.

1,705,067. Construction of roads for heavy traffic and having a foundation course of sand. Samuel S. Sadtler, Springfield township, Pa., assignor to Amiesite Foundation Co.

1,705,068. Construction of roads having a foundation course of sand. Samuel S. Sadtler, Springfield township, Pa., assignor to Amiesite Foundation Co.

1,705,269. Steering mechanism for power shovels. Roy H. Sechrist, Marion, Ohio, assignor to Marion Steam Shovel Co., same place.

1,705,333. Pavement and method of manufacturing it. Charles A. Mullen, Montreal, P. Q., assignor to Amiesite Asphalt Co. of America, Philadelphia, Pa.

1,705,336. Process and apparatus for handling, assorting, and screening material. Byron W. Pape, Ogden, Utah.

1,705,342. Apparatus for the separation of dry materials. Henry M. Sutton, Walter L. Steele, and Edwin G. Steele, Dallas, Tex.

1,705,351. Method and apparatus for the classification of materials by elutriation. Leonard Andrews, Westminster, England.

Exports and Imports

Compiled from the records of the Bureau of Foreign and Domestic Commerce and subject to revision.

Exports of hydraulic cement by countries in January, 1929

Exported to—	Barrels	Value
Canada	3,031	$14,701
Central America	11,977	30,573
Cuba	5,375	16,915
Other West Indies and Bermuda	8,508	27,691
Mexico	10,374	34,021
South America	34,873	133,126
Other countries	4,501	25,975
	78,639	283,002

Imports of hydraulic cement by countries, and by districts, in January, 1929

Imported from—	District into which imported	Barrels	Value
Belgium	Galveston	7,000	$10,392
	Hawaii	100	212
	Los Angeles	40,368	21,622
	Massachusetts	30,733	42,024
	New Orleans	5,000	6,056
	New York	4,000	4,610
	North Carolina	16,380	20,642
	Porto Rico	1,026	1,668
	Rhode Island	14,750	19,390
	Sabine	5,500	8,988
	Total	124,857	135,604
Canada	Maine and New Hampshire	1,500	3,413
Denmark	Porto Rico	19,469	30,385
United Kingdom	New York	5,476	8,574
	Grand Total	151,302	177,976

Exports and imports of hydraulic cement, by months, in 1928 and 1929

Month	Exports 1928 Barrels	Exports 1928 Value	Exports 1929 Barrels	Exports 1929 Value	Imports 1928 Barrels	Imports 1928 Value	Imports 1929 Barrels	Imports 1929 Value
January	56,400	$204,875	78,639	$283,002	234,753	$342,797	151,302	$177,976
February	62,828	221,620	.....	.....	164,408	217,525	.....	.....
March	74,983	265,719	.....	.....	235,930	330,074	.....	.....
April	61,676	205,882	.....	.....	249,458	324,371	.....	.....
May	70,173	236,005	.....	.....	190,509	256,872	.....	.....
June	59,536	201,313	.....	.....	266,537	359,637	.....	.....
July	83,759	291,055	.....	.....	112,887	151,877	.....	.....
August	88,736	302,866	.....	.....	259,988	358,858	.....	.....
September	71,995	252,843	.....	.....	173,439	226,295	.....	.....
October	62,137	246,010	.....	.....	152,210	226,909	.....	.....
November	69,313	260,310	.....	.....	67,240	92,468	.....	.....
December	63,120	250,204	.....	.....	175,992	233,300	.....	.....
	824,656	2,938,702	.....	.....	2,283,351	3,120,983	.....	.....

Domestic hydraulic cement shipped to Alaska, Hawaii, and Porto Rico, in January, 1929

	Barrels	Value
Alaska	594	$ 1,780
Hawaii	21,418	49,341
Porto Rico	3,983	10,652
	25,995	61,773

Relation of Production to Capacity

	February 1929 Per Cent	February 1928 Per Cent	January 1929 Per Cent	December 1928 Per Cent	November 1928 Per Cent
The month	44.8	47.5	46.5	60.4	77.4
The 12 months ended	71.0	75.1	71.0	74.0	74.1

Production, shipments, and stocks of finished Portland cement, by districts, in February, 1928 and 1929, and stocks in January, 1929. (In thousands of barrels)

District	Production 1928	Production 1929	Shipments 1928	Shipments 1929	Stocks at end of month 1928	Stocks at end of month 1929	Stocks at end of January, 1929a
Eastern Pa., N. J. and Md	2,135	2,199	1,456	1,354	6,566	6,933	6,087
New York and Maine	305	412	288	232	1,778	1,984	1,804
Ohio, Western Pa., and W. Va	978	829	487	442	3,393	3,611	3,224
Michigan	303	525	319	302	2,205	2,658	2,435
Wis., Ill., Ind. and Ky	901	862	578	373	3,732	3,911	3,423
Va., Tenn., Ala., Ga., Fla. and La	1,037	887	922	662	1,966	2,180	1,955
Eastern Mo., Ia., Minn. and S. Dak.	747	678	319	215	3,955	4,353	3,891
Western Mo., Neb., Kans. and Okla.	487	482	495	311	1,647	1,782	1,610
Texas	460	399	423	416	460	513	530
Colo., Mont and Utah	108	74	85	57	496	541	524
California	1,164	1,071	1,016	984	764	872	785
Ore. and Wash	172	104	175	100	387	533	529
	8,797	8,522	6,563	5,448	27,349	29,871	26,797

Sulphur and Pyrites in 1928

The production of sulphur in this country in 1928 amounted to 1,981,873 long tons, compared with 2,111,618 tons in 1927, a decrease of 6 per cent, the Department of Commerce announces, in summarizing a statistical canvass made by the United States Bureau of Mines. The shipments in 1928 were record-breaking, 2,082,924 tons, valued at approximately $37,500,000, compared with 2,072,109 tons, valued at approximately $38,300,000, in 1927. Stocks on hand at the mines decreased approximately 100,000 tons in 1928 and totaled about 2,000,000 tons at the end of the year, the smallest since 1921. Two new properties contributed to the sulphur production of Texas in 1928, those of the Union Sulphur Co. at Wharton, Wharton County, Texas, and the Duval Texas Sulphur Co. at Benavides, Duval County, Texas. Texas accounted for 99.88 per cent of the total production in 1928, and, with the shipments of sulphur from stocks in Louisiana, for 99.87 per cent of the shipments. Increased shipments of sulphur were reported for Nevada and Utah.

The average quoted price for sulphur as reported by trade journals was $18 a ton f. o. b. mines throughout the year. Open prices were $1 a ton higher and prices for sulphur exported were given as $22 a ton f. a. s. Atlantic ports.

Exports of sulphur or brimstone from the United States totaled 685,051 long tons in 1928, valued at $14,345,075, of which 159,664 tons were exported to Canada, 125,659 tons to Germany, 109,348 tons to France, 85,500 to Australia, 48,928 tons to Netherlands, 44,098 tons to the United Kingdom, and 22,801 tons to New Zealand. Exports of sulphur or brimstone in 1927 amounted to 789,274 tons. The exports in 1927 were the highest ever recorded and those for 1928 were second in importance. Exports of refined, sublimed, and flowers of sulphur increased from 31,419,221 pounds, valued at $544,373 in 1927 to 44,536,508 pounds, valued at $706,766, in 1928. Imports of "sulphur and sulphur ore" for 1928 amounted to 3,938 long tons, practically all from Canada.

Pyrites Production

The output of pyrites decreased from 215,786 long tons, valued at $804,006, in 1927, to 182,049 tons, valued at $605,459, in 1928, or nearly 16 per cent in quantity. The quantity sold or used by producing companies also showed a large decrease, from 206,724 tons in 1927 to 179,484 tons in 1928, or 13 per cent. California and Virginia produced the entire tonnage recorded for both 1927 and 1928.

Imports of pyrites in 1928 showed an increase of 83 per cent in quantity and 76 per cent in value, from 250,794 long tons, in 1927, valued at $647,512, to 457,973 tons, valued at $1,139,436 and were the largest recorded since 1919. Of the total quantity imported in 1928 Spain furnished 393,840 tons and Canada 56,665 tons.

A Use for Carbon Paste

Repair of metal parts by welding is common practice today and the oxy-acetylene process is saving many dollars which formerly went into the purchase of replacements. Now, when a casting is broken or defective, the damage is quickly remedied by the welding blowpipe. The same applies to a machine part or any metal piece which may have suffered a crack or complete fracture. When all of the broken parts are saved and delivered to the plant welder for repair, the job is comparatively simple, but when pieces are missing it is necessary to build up the missing sections with a filler core which will resist the heat of the welding flame. This is accomplished by using carbon paste.

The following description of the use of carbon paste shows the method employed on a casting where a piece was missing. The break is first filled with carbon paste, which is smoothed to shape with a putty knife. It is necessary that the paste be packed in tightly so that the molten metal will stay where it is intended, thus saving considerable effort in grinding and machining after welding is finished.

Near the center of this casing is a ¼ in. threaded hole for a set screw, part of which was broken out. This hole is carefully filled, and after the welding is finished it is usually necessary only to rethread the hole. If carbon paste or carbon rod is not used for this purpose new holes must be redrilled and tapped. After the welding is completed the piece is annealed, and when cold the carbon paste is easily removed. The inside of the weld will be found to possess the correct contour and little or no finishing should be necessary.

West Virginia Stresses Safety Measures

The lack of specific mining and quarrying regulations applicable to lime and sandstone mines of West Virginia was emphasized by R. M. Lambie, chief of the state mining department, as the outstanding observation of a survey of such mines made recently.

"The state department of mines is responsible for the inspection of sand mines and pits, clay mines and pits, quarries and cement works," a statement by the department says. "The only legislation regarding this industry is a bill passed by the legislature in 1917 authorizing the appointment of an inspector of these industries. The officials of the various companies are quite cognizant of the fact that West Virginia has no regulations other than individual recommendations of the inspectors governing the legal aspect of the safety of operation. Some of the larger companies are developing effective safety organizations and are receiving the co-operation of the department of mines. It is with the smaller companies that safe methods receive but scant consideration and to whom a safety code would fix their responsibility.

"There are over 50 quarrying and mining operations other than coal mining in the state. Mining and quarrying alone employs about 1,700 men, while the allied crushing, lime-burning and cement manufacturing plants employ another 1,100 men.

"The inherent hazards of mining and quarrying are well recognized. The underground mining of limestone is comparatively new in this state and presents a group of particular hazards. That these quarrying and mining operations may be performed in a manner resulting in the minimum of accidents, has been ably demonstrated by several of the operating companies.

"Two of these companies use the 'regulations for pits and quarries' and 'regulations for mines other than coal mines,' as issued by the department of labor and industry of the commonwealth of Pennsylvania as a basis for their safety work. These Pennsylvania regulations have the same weight as the mining code and are virtually industrial laws. The violations of any of the provisions of these regulations is deemed a misdemeanor and so punishable. The fact that some of the most successful companies in safety work have assumed the non-obligatory safety regulations of Pennsylvania as a basis for their safety program, is in itself significant.

"Regulations covering in detail the different phases of limestone mining and quarrying would tend to eliminate to a large degree preventable accidents. The fullest co-operation of the state department of mines with the operating company would thereby be reached and a decided step taken toward the saving the lives of the commonwealth's citizens."

Florida produces eighty-one per cent of the phosphate mined in this country.

Cement Sacks Require Huge Amounts of Cotton

The following excerpt from a recent brochure issued by the Portland Cement Association and entitled "Portland Cement—Its Characteristics, Development, and Manufacture" presents one aspect of the immensity of the industry:

"If the entire output of the industry for a year were put into cloth sacks all at one time there would be needed about 704,000,000 sacks. This of course is never done, but in order that there may be no delay in shipments the companies must maintain some 125,000,000 sacks in service and in reserve.

"Although cloth sacks in good condition are returnable for full credit so many fail to come back to the mills, being either worn out, destroyed or damaged beyond repair, that vast quantities of new sacks are required each year.

"It is estimated that about 10 per cent of all sacks shipped fail to come back to the mill. Last year, during which time some 175,000,000 barrels of cement, or 700,000,000 sacks were shipped, about 500,000,000 were in cloth sacks. Thus, over 50,000,000 failed to return and had to be replaced. A cotton cement sack requires a strip of cloth 36 inches long and 30 inches wide. To replace this number of sacks would require a strip of cloth 30 inches wide and 28,000 miles in length, more than enough to reach all the way around the earth.

"The accounting for sacks, their inspection, cleaning and repair combine to make the returnable sacks a source of considerable trouble and expense to the manufacturers. Yet it is an economical and convenient method of shipping for most users. There are used annually, in addition, nearly 200,000,000 paper bags.

Study of Devices for Recording Pressures

Several different types of manometers have been used for recording the pressures developed during the course of mine explosions, says the Department of Commerce. It is important that the results obtained with the different manometers be compared. Accordingly, the Pittsburgh Experiment Station of the United States Bureau of Mines undertook to determine the relative accuracy or degree of agreement of several commonly used types of manometers. The final comparison included the British Coal Dust (B.C.D.), Crosby, Illinois, Diedrichs, and Bureau of Mines instruments. The comparisons were made by connecting the manometers to a spherical explosion bomb in which mixtures of methane and air or hydrogen and air were exploded. The manometers were connected to the bomb in pairs, the Bureau of Mines instrument being common to all comparisons.

Although analysis and interpretation of the experimental data are not yet complete, it appears as a result of the inter-comparisons that in general the Bureau of Mines manometer indicates a higher maximum pressure than any of the other instruments tested. This was not true in all tests with the B.C.D. instrument, but was uniformly true for all tests with all the other manometers. The Bureau of Mines instrument attained maximum pressure in a shorter time after ignition of the gas than did any of the other manometers except the B.C.D. For the latter, the time to maximum pressure was sometimes greater and sometimes less than for the Bureau of Mines instrument.

The Bureau of Mines instrument showed more favorable characteristics as regards elastic hysteresis than did the other instruments. In the tests using hydrogen-air mixtures, pronounced vibrations appear in the time-pressure records. These are believed to be vibrations of the diaphragms caused by the suddenness of the explosions, rather than by stationary waves set up in the explosion bomb, although the latter appears as a possibility. Initially the vibrations were of approximately the same frequency as that of the experimentally determined free-period vibrations of the respective instruments; but the frequency invariably decreased as the pressure decreased and the vibration died away. The frequency finally reached about one-half the original frequency.

Free Employment Service

Operators—

who are paid subscribers to PIT AND QUARRY and who desire to employ superintendents, managers, foremen, are invited to write us their specifications fully. Their specifications will be forwarded, without charge or obligation, to suitable applicants for such positions.

Superintendents, Managers, Foremen—

who are paid subscribers to PIT AND QUARRY and who are seeking positions, are invited to write us their qualifications fully. Their qualifications will be communicated, without charge or obligation, to those applying to PIT AND QUARRY for help.

Explains Chemical Laboratory

The general conception of a chemical laboratory is merely a collection of queer-shaped glass tubes and receptacles where men spend long, dull hours in mixing and measuring acids and solutions. There is, however, a chemical laboratory maintained by the Department of Commerce at Pittsburgh, Pa., which is of a somewhat different order. This is the Explosives Chemical Laboratory at the Pittsburgh Experiment Station of the United States Bureau of Mines.

Dissecting an anarchist's bomb, analyzing dynamites, or determining the properties of a new explosive are all in the day's work to the Bureau of Mines' chemists employed in this laboratory. The laboratory is maintained for the purpose of analyzing explosives submitted by manufacturers to determine their permissibility for use in gassy and dustycoal mines. In addition, the laboratory keeps abreast of developments in industry by preparing new types of explosives and developing methods for their detection and quantitative estimation. The physical and chemical properties of explosive substances and materials used in explosives are determined in order that such data may be available to the public. At the request of Federal, State or City authorities the laboratory frequently makes examination of bombs and other explosives.

Texas A. and M. College Holds Road School

Starting today, a three-days' course of instructive addresses upon street and highway construction is running at the Texas Agricultural and Mechanical College, College Station, Texas. Speakers have been chosen with the idea of securing the best available talent for their respective topics. These speakers include engineers for the state highway department, city and county engineers, contractors, college professors, and research investigators. No fee is charged. Discussion is invited from everybody who cares to attend.

Myron C. Atwood

Myron C. Atwood Passes

Mr. Myron C. Atwood, president and general manager of the Western Wheeled Scraper Company, died in his home city, Aurora, Illinois, February 26, 1929, after a lingering illness. His death will be widely mourned as he was admired and loved by all who came in contact with him. He received his early business training in railroad work, starting as ticket agent and operator for the Chicago, Burlington and Quincy Railroad at an early age. Through successive and well-earned promotions, he worked his way upward in the railroad world, and was recognized as an authority in matters pertaining to freight rates and classifications. He joined the Western Wheeled Scraper Company, in 1906, as assistant manager. In 1910, he was promoted to the position of general manager and in 1925 he became both president and general manager, which position he held with great ability until the end.

To the earthmoving characters especially, Mr. Atwood's untimely death comes as a personal loss.

Canda-Gayler Absorbs Chrome Steel Works

The business and good will of the Chrome Steel Works, manufacturers of Adamantine grinding balls, has been taken over by the Canda-Gayley Steel Corporation, organized by Abeel Canda and H. Clifford Gayley, who have been the active managers of the Chrome Steel Works for several years. C. E. Meissner, who has been development engineer for the Chrome Steel Works for the past 2½ years, will be sales manager for the new company.

Trumbull Vanderpoel Purchased by Cutler-Hammer, Inc.

Cutler-Hammer, Inc., announces that it has acquired the business of the Trumbull Vanderpoel Electric Manufacturing Company, of Bantam, Conn., which will be operated as a subsidiary under its present name.

White Cement Will Be Made In Texas

Announcement has been made that Houston, Texas, is to have the first plant of what is planned to be a nation-wide chain of factories for the manufacture of white cement. A Texas corporation known as the National Portland Cement Company will operate a plant near Los Angeles, California, where the raw materials from quarries will be burned and then shipped by water to the plant at Houston. Machinery for both plants has been ordered. This will be the only white cement plant in the South.

New Corporations

Sequine-Bogert Co., Inc., Kenvil, N. J. $125,000.

Cleveland Aggregate Co., Cleveland, O. 250 shares n.p.v. F. E. Murphy, E. A. Levine, L. E. Hieber.

Arnold Graphite Corp., Dallas, Tex. $15,000. Morgan S. Staples.

Marion Granite Co., c/o Joseph M. Alsofrom, Jersey City, N. J. $100,000.

Central States Construction Co., Crosby, Minn. $100,000. To crush rock, and operate sand and gravel pits, etc. E. W. Hallett, Henry E. Thellin, both Deerwood, Minn.; M. W. Richards, Brainerd, Minn.; V. R. Wood, Minneapolis, Minn.

Blue Creek Stone Co., Decatur, Ind. $10,000. To quarry stone and gravel. Theodore W. Baker, John Hisey, Lee Boehm.

Lime Rock Products Co., Spring Grove, Minn. $50,000. To quarry and crush rock and lime products, sand and gravel, etc. A. A. Honaas, Pres.; Henry Langland, V. P.; Peter Bergrud, Sec.-Treas.

Limestone Land Corp., Q. Austin East, 106 Citizens Bldg., Bloomington, Ind. $100,000. Chas. Hinkle, S. B. Gibson. To buy, drill, then sell limestone land.

Standard Products, Inc., Medford, Ore. To produce limestone and manufacture sand-lime brick and lime fertilizer. J. H. Weber, Pres. & Mgr., 603 N. Harvard Blvd., Los Angeles; T. H. Callaghan, V. P. & Treas., Medford, Ore.; M. T. MacNeff, Sec., Medford, Ore.

Blue Ridge Silica Corp., A. K. Peters, Pres., Roanoke, Va.

Quality Sand & Gravel Corp., Canton, Ohio. William Schneider, Raymond Boron.

Weeks & Dillon, Fayetteville, N. Y. 500 shares n.p.v. Attorneys, Costello, Cooney, Fearon, Syracuse, N. Y.

Lincoln County Gravel Co., Brookhaven, La. $150,000. N. W. Rockett, H. E. Major, Tallahala St., Hattiesburg, Miss.

Prospect Sand & Stone Co., Muskego, Wis. 1000 shares, $100 each. E. H. Spoor, W. Moran, E. Pagliarul.

Sand & Gravel Supply Co., Yakima, Wash. $10,000. Lee S. Ross, Henry A. McNeil.

Onderdonk Sand & Gravel Corp., T. F. McDermott, Albany, N. Y. $10,000.

Middlesex Sand & Gravel, Inc., Raritan, N. J. $50,000. Harry Ivens, New Brunswick, N. J.

Central Jersey Sand & Gravel Co., Asbury Park, N. J. 10,000 shares com.

Neal-Roberts Gravel Co., Inc., Monroe, La. $50,000.

Pyramid Portland Cement Co., Wilmington, Del. 1000 shares n.p.v.; $2,000,000 authorized. To manufacture cement. Joseph J. Boehm, agent, Sec. of State's office, Jefferson City, Mo.

San Diego Lime Products Co., c/o Stearns, Luce & Forward, attorneys, Mr. Frederic W. Stearns, 1220 San Diego Trust & Savings Bldg., San Diego, Calif. $1,500,000; 20,000 shares com.

S. W. Barrick & Sons, Inc., Woodsboro, Frederick Co., Md. 500 shares n. p. v. Samuel W. Barrick, Leonard C. Barrick, Oscar S. Barrick, Harry W. Barrick. To mine and quarry limestone.

Mt. Logan Gravel Co., Inc., Columbus, O. 250 shares n.p.v. G. D. Baker, W. H. Walker, C. C. Crabbe.

Burleigh Sand & Gravel Co., Palmer M. Way, Wildwood, N. J. $125,000.

California Rock Asphalt Co., 701 Post St., San Francisco, Calif. $1,500,000. To own and develop asphalt and bituminized sand deposits.

Ontario Sand & Gravel Co., Geneva, N. Y. $50,000 pfd.; 1500 shares n.p.v. Nestor Roberts, Pres.; Louis DePillo, V. P. & Mgr.; H. B. Graves, Sec.-Treas. The officers and James Ryan and Mrs. Mary A. Roberts, are directors. Has taken over equipment of DePillo-Balestriri Company.

Krueger Development Co., J. C. Wilcox, Box 232, Leitchfield, Ky., W. A. Batten, 1615 Frederica St., Owensboro, Ky. W. O. Krueger, Engr., R. C. Holmes, Leitchfield, $110,000. Will develop rock asphalt deposits at Leitchfield.

PIT AND QUARRY FOREIGN DIGEST

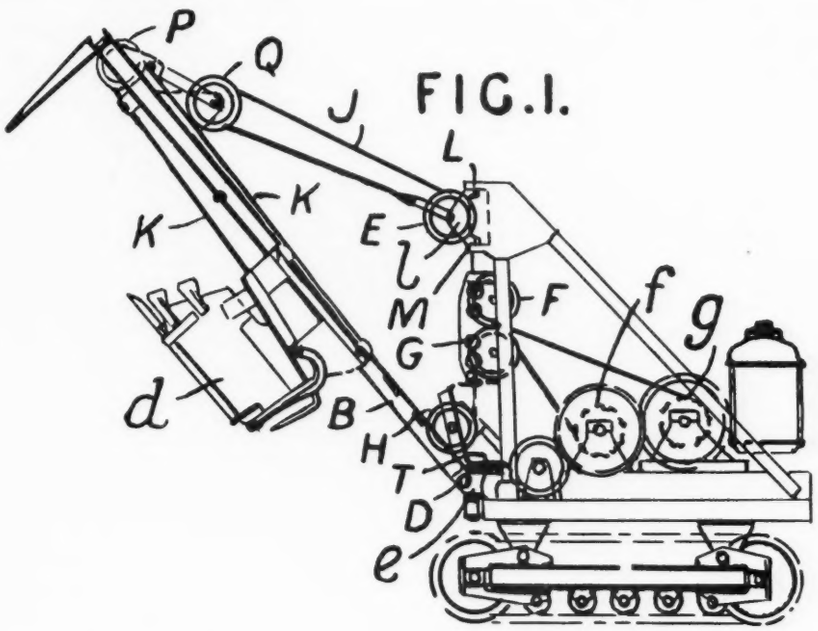


FIG. 1.

Excavating

An excavator comprises a boom B (Figure 1) slidably supporting a scoop *d* and supported on a horizontal pivot D by a shoe *e* provided with a vertical trunnion to permit slueing of the boom; the rope K operating the scoop passes over a pulley P on the boom and round pulleys H, G, on the superstructure of the machine to a drum *f*, while the rope J for raising the boom passes from a pulley frame *l* supported on vertical trunnions L, M, over a pulley Q on the boom, round a pulley E in the frame *l* and round a pulley F on the superstructure to a drum *g*, the frame *l* and the pulleys E, H being so arranged that the lengths of rope between the pairs of pulleys coincide with the axis about which the boom slues so as to be subjected to a pure twisting action during such slueing. Slueing is effected through a toothed sector T preferably through a transmission.—T. D. Denholm, (British Patent 299, 514).

Cement Standards

Tests have shown that the strengths of two different cements according to the standard specifications do not run parallel. Greater uniformity of results is obtained with larger water content, such as corresponds to practice, provided the setting time is reduced to 2 or 3 days instead of 28. The same uniformity may also be obtained if the standardized stamping and mixture consistency is retained by increasing the cement sand ratio. The anomalies of the standard tests are explained on the supposition that the binding and hardening processes proceed at different speeds in different cements.—B. Geitlin (Tekniska Foreningen i Finland 48, 181-7, 1928, and C. A.).

Rock Drills

In a rock drill or like reciprocating tool, the distributing valve 50 (Figures 4 and 5) is driven independently of the main piston 13 by means of a motor comprising intermeshing gear wheels 22, one wheel being mounted on the valve spindle 51. Operating fluid is supplied to the gear wheels by a passage 26 and exhaust takes place through ports 27. Fluid passes from a groove 28 in the valve-chest to the interior of the valve 50 by ports 29 and is distributed to the ends of the main cylinder by valve ports 30, 31. Exhaust ports 53, 54 in the main cylinder are connected to exhaust ports in the valve chest by recesses 55, 56 in the exterior of the valve. In a modification a separate exhaust valve is employed, mounted on the spindle of the other gear wheel. An adjustable port may be provided for controlling the supply of motive fluid to the valve independently of the supply to the gear wheels.—A. T. and K. J. Holman (British Patents 298,935).

Cement Compositions

A composition for making building blocks and tiles, comprises a mixture of Portland cement and a pulverized material containing hydrated magnesium silicate such as chlorite and serpentine but not asbestos. Coloring substances or metal dust or filings which give a desired color when oxidized may be added as well as small pieces of metal or carborundum.—Palm and Thorsson (British Patent 288,903).

Aluminous Cement

Products containing calcium aluminates are produced by melting together raw materials containing lime and alumina respectively, removing wholly or partially the content of silicic acid in the raw material containing alumina by melting it with reducing agents in the presence of a smaller quantity of raw material containing lime than is to be contained in the end product, and adding the rest of the raw material containing lime after the intended reduction of silicic acid has taken place. The composition of the charging materials is so adjusted that the slag obtained in the reduction process will contain less than 20 per cent lime.—Bouthron & Haglund (Canadian Patent 284,109).

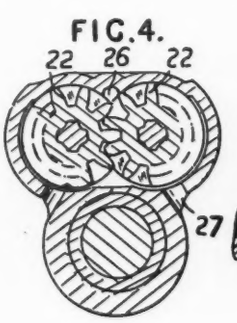


FIG. 4.

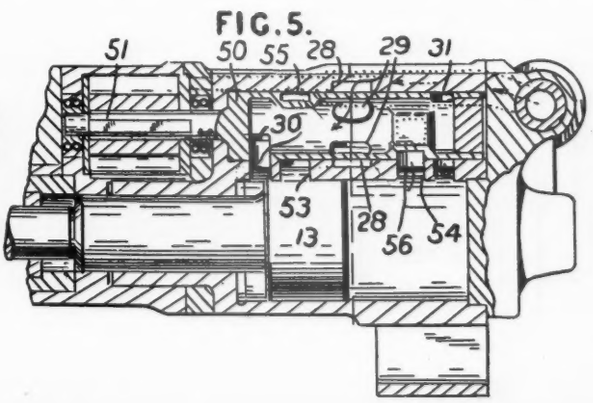
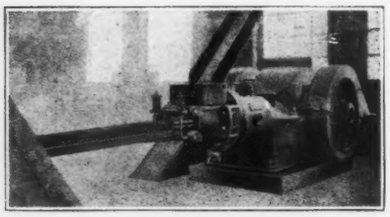


FIG. 5.



Briquette Press in Cement Works

Raw Slip Briquettes

A press for rapid and efficient molding of dry raw slip for vertical cement kilns has been devised in France. The briquettes are especially shaped for this purpose. They are cylindrical, with a diameter of about 4¾ inches, their length a little greater. The press, shown in illustrations, makes use of a horizontal piston. This is directly connected to a motor fitted with a speed reducer. Two pressure pistons are carried at the head of the shaft. The front part of the compression chamber is simply a closed tube. The material leaves the press as a continuous cylinder, being cut into lengths as it moves on the belt conveyor. This press performs a series of compressions on the material before it leaves the machine, thus expelling all the air. The belt conveyor travels to the charging door of the kiln. The press produces about 25,000 lb. of briquettes per hour, thus having a large capacity.—Rudishuli (Le Ciment, January, 1929).

Properties of Plaster

Naturally occurring plaster exists in two chemical states. One is the anhydrous, containing no water. It is used principally as an achitectural ornament. The other is the well-known alabaster or gypsum, of great industrial importance. It contains two molecules of water and occurs in several crystalline forms: crystalline plaster rock, rock plaster in spear-head crystals, laminated crystals, fibrous plaster rock, and alabaster, a dense form. Only rarely does gypsum contain only calcium sulphate and water, the usual impurities being clay, sand, dehydrated bituminous substances, calcium carbonate, and iron oxide.

Plaster is made from gypsum by driving off 75 per cent of its water content, leaving the demi-hydrate. This water is evolved at 223 deg. F., but the temperature at which this transformation proceeds at practicable speed is 262 deg. F. When mixed with water the burned plaster sets, in the following steps: 1) Some of the plaster goes to the dihydrate; 2) this dihydrate dissolves in the water and forms a saturated solution; 3) some of the water evaporates because of the heat evolved in the reaction. This causes the solution to become supersaturated, and crystals separate out, a process which effects the setting of the whole mass; 4) the maximum hardness is reached when the plaster has lost just enough water so that the whole mass has the composition $CaSO_4.2H_2O$. The setting is accompanied by an evolution of heat and an increase in volume of 20 per cent. Addition of various salts either accelerate or retard the setting.

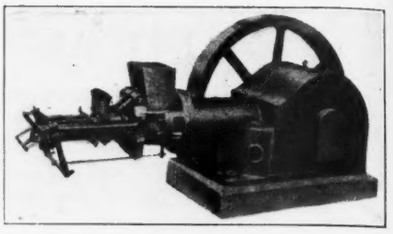
Plaster of Paris causes oxidation of iron, and its direct application to this metal must be avoided. As it is slowly soluble in water, it should not be employed where it is likely to be permanently submerged. On the other hand it does not absorb moisture from the air. Its hardness and strength gradually increase on continued exposure to a high figure, but its value as a construction material is more dependent upon its hydraulic properties. The following substances should be tested for in estimating the value of a plaster of Paris: crude gypsum, showing under burning; demi-hydrate, the active and principal constituent; soluble anhydride, active but rarely found in commercial plaster hydraulic plaster, which sets very slowly and is formed during overburning; dead-burned gypsum, which is inert; natural anhydrite, also inert; and casual impurities.—A. Pellat (Le Ciment, January, 1929).

Portland Cement from Gypsum

When ammonium carbonate and calcium sulphate react, a double decomposition occurs according to the following equation:

$$(NH_4)CO_3 + CaSO_4 \rightarrow (NH_4)_2SO_4 + CaCO_3$$

This reaction, when taking place in an aqueous medium, occurs very slowly, the ingredients being aqueous ammonia, carbon dioxide (from the air) and gypsum. The slight speed of the reaction is attributable to the inconsiderable solubility of the gypsum and to the fact that the carbonate formed precipitates upon the unreacted particles of sulphate, inhibiting the reaction still further. The time of reaction in aqueous media was 5 to 8 hours. By working under pressure in an autoclave, and by the addition of an inert substance to assist the suspension of the gypsum, the time of the reaction was reduced to 40 minutes. But as the inert material used was a clay, the final insoluble product was a finely divided Portland cement slip. The reaction was carried out as follows: 400 parts of air-dried gypsum, 80-mesh; 350 parts aqueous ammonia, 28 deg. Bé.; 70 parts clay; and 600 parts of water; were introduced into an autoclave and heated only to 125 to 160 deg. F. Carbonic-acid gas was added under constant pressure and this pressure maintained in the autoclave throughout the reaction. The sulphate solution was then recovered and the very homogeneous precipitate burned to give a Portland cement with an hydraulic modulus of 2.1 and an index of 0.43. The solution contained about 28 per cent of ammonium sulphate. The composition of the slip may be regulated by the clay started with. In future it is intended to use flue gases as a source of carbon dioxide.—P. Baud (Comptes rendus de l'Acad. des Sciences et Le Ciment, January, 1929).



Briquette Press for Crude Slip

Mortar

Lime or cement mortar is made impermeable by the progressive decomposition of an alkali silicate in its pores with the increasing concentration of a precipitant such as alcohol or phenol, the mortar acting as a dehydrant. For example a mixture of solutions of alkali phenolate and silicate is used for this purpose.—A. Flexer (French Patent 639,637).

Trass and Lime

Trass and lime were ground together and mixed with a little water and molded into a suitable specimen which was stored in a saturated atmosphere. After 7, 30 and 56 days of storage the 1-gm. sample was ground up and added slowly to 60 cc. of cold hydrochloric acid (1.12). The sample was then filtered and the MO and SiO determined in the filtrate. The bulk of the reaction was complete at the end of 30 days.—A. Steopoe (Tonindust.-Ztg. 52. 1609-12 (1928)).

Preserving Stone

The surface is coated with a waxy material such as beeswax, which is heated and quenched in a freezing mixture to raise its melting point, and is burned into the surface by a blow-lamp electric grid or the like. An acid-proof material such as a protecting layer of kieselguhr also may be applied. H. Schmid. British Patent 290,331. 1927. C. A.

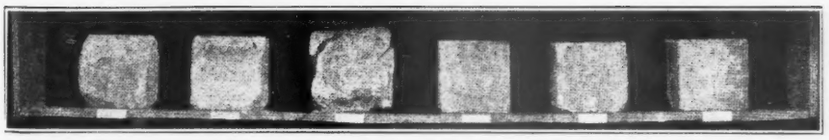
Thermal Constants and the Strength of Light Aggregates

Thermal conductivity constants were determined by measuring the rate of rise in temperature in the centers of 6-by-12 in. cylinders heated from the surface and calculating the diffusivity by the mathematical theory of heat conduction. The proportion of cement to aggregate has little effect on heat conductivity. Concretes made from various Japanese lightweight aggregates have 1/2 to 1/3 the heat conductivity of those made from common sand and gravel. An approximate relation between heat conductivity (k) and voids (v) is K= 0.005/0.5v. Minoru Hamada. J. Faculty Eng. Tokyo Imper. Univ. *17*, 201-12 (1928). C. A.

Excavating Gear

Boom slueing gear for an excavator comprises a driven toothed member secured to the boom and a driving toothed member carried by a transmission shaft capable of being driven in either direction, through clutches axially movable thereon, from a main driving member rotated in one direction only. A brake normally holding the transmission shaft is released when either clutch is moved into operative position.

As shown in Figures 1, 2 and 3, a shoe *c*, which supports the boom on a horizontal pivot and is rotatable about a vertical axis, is secured to a toothed sector, etc., *T* engaging a worm *S* on a shaft *U*. A freely-mounted main driving member *I* drives a freely-mounted member *O* through reversing bevel gearing *Y*, *h*, *Z*; clutches *W*, *M* keyed to the shaft *U* and normally held in inoperative position by springs *j*, *k*, are engaged with the members *I*, *O*, respectively, when desired, by rotation of sleeves *i*, *m* provided with helical surfaces engaging similar surfaces on stationary abutments *n*, *R*. The sleeves *i*, *m*, are operated through links *r*, *s* respectively from a shaft *t* and a sleeve *a* each provided with an acuating pedal 1, 2. The shaft *t* and sleeve *a* also carry members 3, 4, each provided with a slot 5 engaging a rod 6 controlling a brake band *v* normally held in engagement with a brake drum T', by a spring. T. D. Denholm (British Patent 299, 515).



5 per cent Addition made of

Standard Sand Powder	Water glass Powder (Crude)	Water glass Powder (soluble)	Standard Sand Powder	Water glass Powder (Crude)	Water glass Powder (soluble)
Portland Cement			Blast furnace Cement		

Figure 5. Test mortar pieces cured in magnesium sulphate solution. (From Zement)

Powdered Water Glass and Cement

The use of water glass as a surface treatment on concrete is very old and has been used in paving to decrease the permeability of the surface for long. It has also been used in the gauging water to accelerate setting. Fusion of silica (sand) and caustic soda results in a bluish glass difficultly soluble in H_2O. After solution, and evaporation, however, a product is obtained which is easily soluble. Both forms were tested. It was found that the addition of either form as a powder to standard concrete mixes was without favorable influence upon the resistance of the mortar either to salt water or to permeability by fresh water. The watertightness remained unaffected, the resistance to salt water somewhat lessened. A favorable effect, it is concluded, cannot be expected by adding powdered water glass to cement-mortar mixes, and it is not recommended for practical work. Figure 4 shows the effect of water glass addition to Portland cement mortar. Figure 5. Test cubes of Portland and blast furnace cement mortars cured in magnesium sulphate solution. R. Grun (Zement, February 14, 1929).

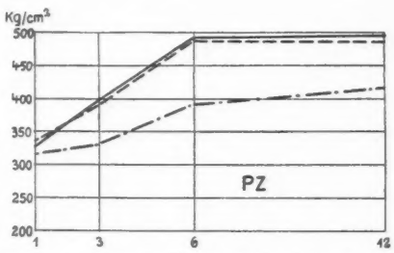


Fig. 4. Compressive strengths after indicated months curing
———100 cement + 5 std. sand pow.
.....100 cement + 5 crude water
—.—.—100 cement + 5 soluble water glass.

Capacity of Rotary Kilns

Meade's formula for the capacity of a rotary kiln, in metric terms, is:

$C=(\frac{3}{4}L+4.7)\times 6.0F.$

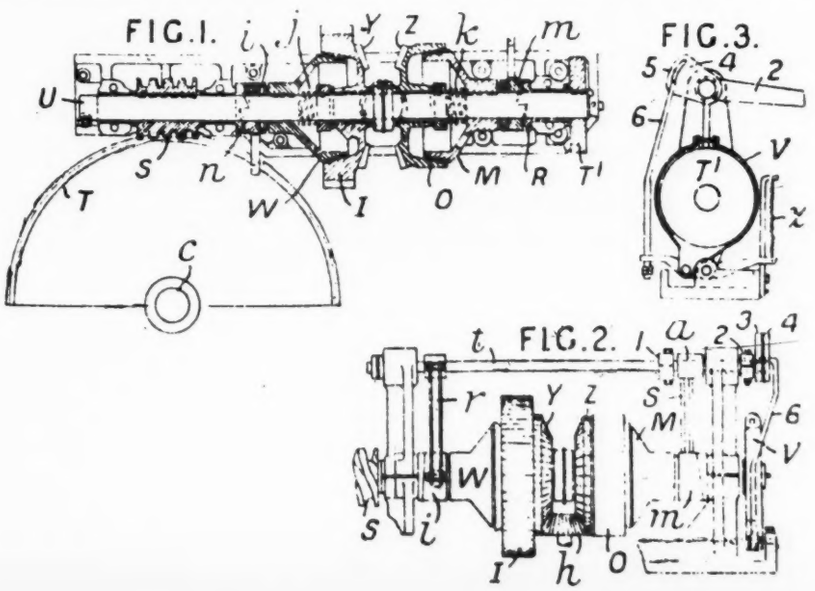
C=capacity in barrels per 24 hours.
L=length in meters.
F=Area of cross section in square meters.

This is said to be an empirical formula based on a number of rotary kilns in operation. A formula for maximum burning capacity is proposed as follows:

$C=7.0$ [up to 9.0] X $P^{1.5}\times \sqrt{L}$. or
$K=1.2$ [up to 1.3] X $P^{1.5}\times \sqrt{L}$.

C=capacity in barrels per 24 hours.
K=capacity in tons per 24 hours.
P=Inner circumference in meters.
L=Length of the kiln in meters.

The numerical coefficient varies with the ease or difficulty of the sintering. A change must be made in formula for use with wet process. Meade's formula is satisfactory for short kilns not forcing their capacity, but otherwise the other formula is to be preferred. W. Zollikofer (Zement, February 14, 1929).



INTIMATE NEWS OF MEN AND PLANTS

Johns-Manville to Market Florida Travertine

It is announced that the Florida Travertine Company will develop a deposit recently discovered near Bradenton, Florida. The entire product is to be marketed by the Johns-Manville Corporation, which is shipping initial consignments to the North.

Sandusky Interests Take Control of Crescent

Expansion of the Sandusky Cement Company was recently announced through the purchase of more than 90 per cent of the capital stock of the Crescent Portland Cement Company, Wampum, Pennsylvania. One thousand two hundred shares were purchased from former Crescent stockholders.

A new board has been elected and it has named the following as officers: J. B. John, president; E. J. Maguire, vice president and treasurer, and Fred Pickford, secretary. All of these men are officers of the Sandusky Cement Company of Cleveland. Directors consist of John Maguire, W. B. Newberry, Attorney A. C. Dustin, all of Cleveland; Andrew Berger and B. J. Jarrett, Pittsburgh.

The company will be operated as the Crescent Portland Cement Company, and no drastic changes are contemplated. The Sandusky Cement Company recently increased its capital stock from 75,000 to 225,000 shares and voted stockholders a two-for-one split.

Oregon Moves Into New Office And Warehouse Building

The Oregon Portland Cement Company late in January moved from its quarters in the Wilcox Building, Portland, to its own modern office and warehouse building just completed.

Cleary Working on Plans For Torrance Plant

W. H. Cleary, Detroit engineer, has taken charge of the construction of the plant the Hercules Portland Cement Company is erecting at Torrance, California. He is proceeding at once with the work of preparing plans and laying out the plant. H. H. Helbush, Los Angeles capitalist, is president of the company. The latter recently purchased the 150 acres upon which the plant is to be built.

William A. Herrick Dies

W. A. Herrick, general manager and vice-president of the American Silica Company, died recently at his home in Ottawa, Illinois, after an illness of two weeks of heart disease. He had been prominent in Ottawa's extensive sand interests and had assisted materially in bringing that industry to its present prominence. He was born at Brooklyn, Maine, in 1871, and with his family moved to LaSalle county, where with the exception of a few years spent in Chicago he has continued to reside.

Bessemer Buys Property In Pittsburgh

The Bessemer Securities Company, holding company for the limestone and cement organization of the same name, will some time in the future build a cement plant on a tract of land just purchased at Pittsburgh, Pennsylvania, according to President L. A. Beeghly.

The property was purchased from the National Tube Company and adjoins a steel plant, whose slag it is planned to utilize.

Oregon Officers Re-elected

With one exception, all officers of the Oregon Portland Cement Company were re-elected at a recent meeting, at Portland, Oregon. The retirement of Chester V. Dolph required the naming of another director and Lester W. Humphreys was chosen.

R. V. Butchart was re-elected president; H. A. Ross and L. C. Newlands, vice-presidents; H. L. Knappenberger, secretary and treasurer; F. E. Caslin, assistant secretary and treasurer, and Edward Cookingham and E. B. Ireland, other members of the board. Newlands also was renamed general manager.

Fleming Appointed Manager Of Portland Cement Bureau

E. M. Fleming has been appointed manager of the Highways and Municipal Bureau of the Portland Cement Association with headquarters at the general office in Chicago, according to announcement by William M. Kinney, General Manager of the Association. He succeeds L. S. Trainor who resigned January 1.

Mr. Fleming joined the staff of the Association in 1926 as a field engineer in the Indianapolis district, and for the past year has been street engineer in the bureau at Chicago headquarters.

He was associated with the Illinois Division of Highways in various executive capacities for approximately six years during construction of that state's model concrete highway system. His experience also includes road contracting, railroad construction with the Pennsylvania railroad, mining engineering, and pier and wharf construction. He is an alumnus of the University of Pennsylvania and is a member of the American Society of Civil Engineers.

New Lime Plant Will Be Modern One

The preliminary survey for a switch from the main line of the Southern Railway tracks about five miles west of Tuscumbia, Alabama, to the landing on the Tennessee river on the property of the National Lime, Cement and By-Products Corporation was made recently.

The switch will afford the lime plant, which the company is preparing to build, both river and rail transportation for lime and also for stone to be used on Mississippi river abutments. Francis L. Hoff, president of the lime firm with headquarters in Buffalo, New York, states that the company is preparing to expend more than $300,000 in equipping the lime plant and quarry which, it is said, will be one of the most modern and best-equipped plants of its kind in the South.

Large Shipment of Marble By Carthage Corporation

A double trainload of Carthage marble, said to be the largest marble shipment in the history of the industry in the United States, was shipped from Carthage by the Carthage Marble Corporation. The 75 cars were consigned to points in eleven states. The company has shipped more than 200 carloads since January 1st. Officers of the corporation are George Busboom, president; A. J. Mayer, vice-president; J. R. Rauh, secretary-treasurer. Mr. Busboom, Mr. Mayer, W. E. Carter and B. L. Van Hoose, all of Carthage, and E. C. Wampler, of Chicago, are directors.

Gravel Company Changes Hands

The Elkhart Sand and Gravel Company of Elkhart Lake, Wisconsin, has purchased the Moraine Gravel Company of Plymouth, with a plant at Glenbeulah, according to an annuncement made by the former concern. This deal makes the Elkhart Lake company one of the largest producers of sand and stone in the state. The company now owns more than 1,000 acres of valuable gravel deposits. The main sales office will be located at Elkhart Lake.

New Gravel Plant for Ashland, Nebraska

The LeGrand Limestone Company of Des Moines, Iowa, has decided to erect a modern sand and gravel plant north of Ashland, Nebraska. It has purchased 40 acres of land and has an option on an additional 160 acres, it is announced.

Missouri Marble Quarry Makes Trainload Shipment

On February 20, 1929, two trainloads of marble from the quarry of the Carthage Marble Company were shipped, with much demonstration by the Carthage Chamber of Commerce. The sixty-nine carloads were consigned to contractors of building in New York, Chicago, St. Louis, Denver, and Kansas City.

Georgia Gravel Company Making Improvements

The Georgia Gravel Company of Columbus, Georgia is enlarging its plant facilities. A new pump and other equipment has been installed.

New Sand and Gravel Company Acquires Large Holdings

The Ontario Sand and Gravel Company of Geneva, New York, has been recently incorporated. It will acquire the large sand and gravel pits and plants on Phelps Road near Five Points, and additional new equipment will be installed.

The new company is capitalized at $50,000 in preferred stock and an issue of 1500 shares of no par value. The officers include: Nester Roberts, president; Louis DePillo, vice-president and manager; and H. B. Graves, secretary-treasurer. To these are added Mrs. Mary A. Roberts and James Ryan as directors.

Colorado to Have Large Granite Plant

The Lane Manufacturing Company, a Vermont concern, is erecting, on the outskirts of Salida, Colorado, a granite manufacturing plant which will be operated by George Wallstrom, a former Barre, Vermont, granite man.

The plant is being erected for the Stonehenge Granite Company, which operates a quarry formerly known as the Federal, about twelve miles from Salida. The building is 602 feet long, 60 feet wide and has twelve bays, each twelve feet deep, giving room for the employment of 150 to 200 men. There are ten thousand panes of glass in the building, thirty carloads of building material, five miles of wire and from one and one-half to two miles of pipe. The plant is modernly equipped, including a saw with a 12-foot blade.

"Diamond Cement" Leaves On First Trip

The freighter "Diamond Cement" of the Pacific Coast Cement Company sailed from Seattle February 26th on her initial voyage to the lime rock quarries on Dahl Island, Southeastern Alaska. Capt. J. E. Guptill is in command.

Carolina Marble Purchases Additional Quarry Properties

J. A. Martin of the Carolina Marble Products Company, Asheville, North Carolina, has purchased the properties of the Regal Blue Marble Company near Andrews, Cherokee County. The Company has also bought a second quarry near the Regal plant to which a railroad siding has been built.

Atlantic Gypsum Plans Extensive Improvements

The Atlantic Gypsum Company, Ltd., of Turo, Ontario, has announced plans which include the expenditure of $600,000. These include the enlargement of its present plant, the purchase of additional acreage and the construction of a new pier at Cheticamp, Cape Breton. In order to secure additional business and fill its contracts this work must be completed in the early summer.

Quarter-Million-Dollar Plant at Richmond, Virginia

Richmond Sand and Gravel Company, Richmond, Virginia, is said to be planning a new storage and distributing plant to cost more than $250,000, including conveying, loading, and other equipment.

Marble Firm Changes Hands

C. W. Hall, vice-president and manager of the Ross and Republic Marble Company, announces that all of the properties of this company have been acquired by the Virginia Alberene Corporation. More than $250,000 is to be expended immediately in an expansion of the quarry and mill at Knoxville, Tennessee, to increase capacities approximately 50 per cent.

Lone Star Cement Building Fuel Oil Tanks

The Lone Star Cement Company, Louisiana, formerly the Louisiana Portland Cement Company, has asked bids on the construction of circular concrete fuel oil tanks at its plant in New Orleans.

Signal Mountain Reelects Officers

All officers of the Signal Mountain Portland Cement Company of Chattanooga, were reelected at the recent annual meeting of the stockholders and board of directors. Officers of the company are: W. A. Sadd, chairman of the board; John L. Senior, president; Hardwick Caldwell, vice president; Francis P. Butler, vice president; J. P. Hoskins, treasurer and R. R. Caskey, secretary.

Marion Purchases Richwood

The Marion Sand and Gravel Company of Marion, Ohio, has purchased the entire property of the Richwood Gravel and Stone Company. The two plants will be operated under the Marion title. The new owners will retain the present force, including Mr. Krause, plant superintendent. L. K. Warner is president of the Marion Company, and Wilbur Symes is secretary.

Stewart Sand Constructs Storage Plant

The Stewart Sand and Material Company of Kansas City, Missouri, has arranged to construct a new storage and distributing plant in North Kansas City. The building will be 65 by 80 feet and cost, including equipment, about $40,000.

Volunteer Portland Reported Planning Third Unit

The Volunteer Portland Cement Company of Knoxville, Tennessee is reported planning to erect a third unit during 1929 to consist of a new kiln and accompanying equipment.

NEWS OF EQUIPMENT MANUFACTURERS

A Belt Conveyor That Is Portable and Revolvable

The Greenville Manufacturing Works, which is a division of American Aggregates Corporation, has issued a leaflet entitled The Stacker. The stacker itself consists of a portable belt conveyor of any width, length or capacity, depending upon requirements. It is mounted on caterpillars and moves anywhere on its own power, is full-revolving like a steam shovel, is pivoted, can be tilted at any angle, and can be equipped either with electric power or with internal-combustion engines.

The company's engineers will personally inspect any property and will advise as to whether or not this stacker will prove a desirable addition.

A Light One-Man Drill

The Howells Mining Drill Company makes about fifty types of drills for use in all kinds of ground, hard or soft. These are built to be operated by electricity, compressed air, steam or hand-power. They are very light —hence readily portable—and they prove of particular utility in open pits or quarries of cement rock, gypsum, hard clays, slate, shale, talc, salt, decomposed granite, and even of much harder materials. Any one of these drills may be operated, without mechanical support, by a single man as an ordinary breast drill. Where operations are under cover so that upright members known as posts can be secured against floor and roof, the drill is rested in such posts and thereby geared for fast penetration; but in open work or where the roof is high, what is known as a driving bar is used. In this practice the operator first uses the machine as a breast drill. Using a short bit, he drills a small hole about six inches deep. Into this hole he then drives the bar and this bar becomes a support for the steel in drilling the larger or blasting holes.

The machines will operate in any position, at any angle. One model that proves popular among quarrymen is the Spry one-man electric drill, used with a double post or so called B post. In this machine the bit or auger is fed forward by a thread bar and an open nut which rests in notches of the post, so that the operator has very little weight to handle and is required simply to steady the motor.

Rebuilt Motors, Generators And Compressors

The Rockford Power Machinery Company is distributing Bulletin 35 which consists of 52 pages illustrating, describing and giving the prices on a large stock of rebuilt machinery. This bulletin contains information and prices of most types and sizes of generators, compressors and motors together with a long list of other useful equipment for the industries. In addition, a large corps of engineers, electricans and mechanics are readily available for repairing and inspecting this class of equipment. The bulletin also points out that while an extreme reduction in prices is being offered, it in no manner affects the quality of the equipment which is purchased under a one year guarantee.

Huebotter Joins Waukesha

H. A. Huebotter, well known to automotive and Diesel engineers, has recently joined the technical staff of the Waukesha Motor Company. He comes from the Butler Manufacturing Company of Indianapolis, Indiana, where he was chief engineer. Mr. Huebotter is a member of the Society of Automotive Engineers and is the author of the book Mechanics of the Gasoline Engine. He has been engaged in both practical and theoretical research for a number of years.

The Bargain Sheet

The Gregory Electric Company issues a monthly booklet which is called its "Bargain Sheet," although the March number contains 80 pages and a number of illustrations. This company specializes in the rebuilding and re-sale of motors, generators, and other electrical equipment. Every machine is completely dissembled and each part is examined and tested or replaced. After reassembling, the machine is carefully tested under load, refinished and turned out practically equal to new, both in appearance and service value. A thirty days' approval is a guarantee that the equipment must fulfill the specifications under which it was purchased.

This company has a department of rentals, organized to give especially prompt service and furnish machines not only in emergency and breakdown cases, but when a motor, generator, transformer or other equipment is required for temporary use. Because of the large stock of equipment carried at all times, it can give immediate attention on almost all requirements. The Gregory Electric Company will be glad to mail its monthly "Bargain Sheets" to all interested persons.

Hardinge Company Moves New York Office

On March 23rd, the New York office of the Hardinge Company moved from 120 Broadway to the Chanin Building, 122 East 42nd Street.

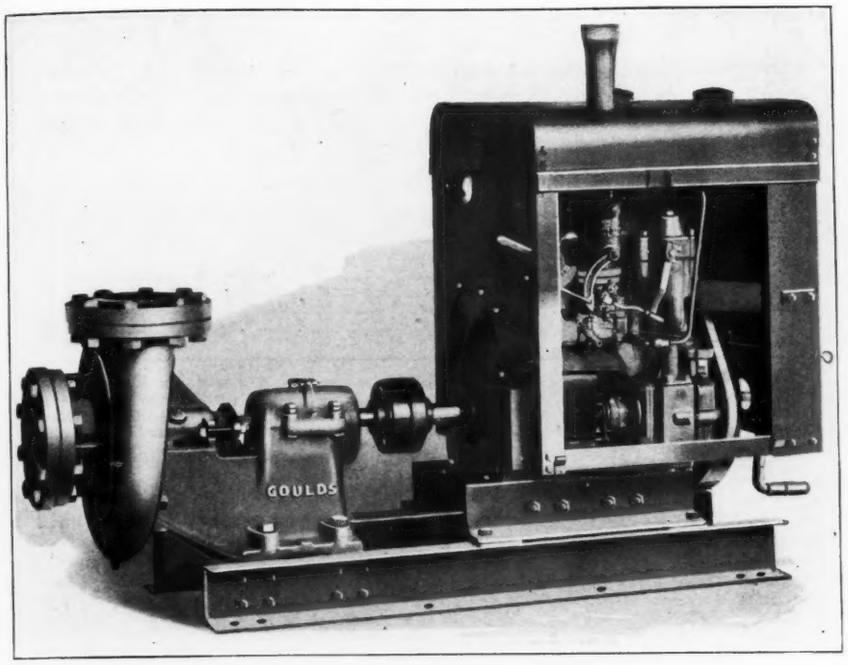
Link-Belt Elects Watson to Vice-Presidency

James S. Watson has been elected vice-president of the Link-Belt Company, with headquarters at the company's Dodge Works at Indianapolis, Indiana. Mr. Watson was born in Philadelphia and has been with the company continuously for thirty-four years. In January, 1903, he took charge of the silent chain as a power transmitting medium. Mr. Watson is general manager of the company's Dodge Works, and in full charge of the production of silent and roller chain drives. He is also responsible for the selling of these drives, as well as the Herringbone speed reducers through a group of power transmission engineers located in practically all of the principal cities.

Butler Bin Announces New Distributors

The Butler Bin Company, manufacturers of steel storage bins, weighing and measuring hoppers, and bin gates, announce the appointment of the following new distributors:

Arizona Road Machinery Company, Phoenix, Ariz.; General Equipment Machinery Company, Miami, Fla.; Hofius-Ferris Equipment Company, Spokane, Wash.; J. B. Harbison Equipment Company, Little Rock, Ark.; Loggers & Contractors Equipment Company, Portland, Ore.; Mechanical Supplies Company, Cincinnati, O.; W. T. McDonald & Company, Indianapolis, Ind.; New Mexico Road Machinery Company, Albuquerque, N. M.; Stannard-Arnold Company, Salt Lake City, U.; J. C. Sheehan & Company, El Paso, Tex.; Tri-State Equipment Company, Memphis, Tenn.; Taylor Tractor Company, Columbus, O.; Geo. V. Treen & Company, Charleston, W. Va.; and Wiley Brothers, Inc., Oklahoma City, Okla.



Four-Inch Pump With Red Seal Engine

Modern Equipment Company Expands

Word has been received that the Modern Equipment Company has been formed to take over the assets of the O. E. Szekely Corporation, conducted as an independent business. Lorimer Dunlevy, formerly general sales manager of the O. E. Szekely Corporation, is head of the new organization. The new company will continue the manufacture of a complete line of direct-connected a.c. and d.c. generating sets, ranging from 3 kw. to 50 kw., and in addition will continue the interesting line of centrifugal, diaphragm, and piston type pumps, as in the past.

The illustration shows this company's 4-inch pump, driven by a Continental Red Seal industrial engine. Such an outfit has a wide field for use in large dewatering projects and for supplying water in large quantities at a comparative low pressure. A complete range of sizes is available from 2-inch to 8-inch, each arranged for either portable or stationary mounting and driven by a proper size of Red Seal Continental engine. The pumps are made by Goulds Pumps, Inc., and are of unit-construction design, in that the base holds both the pump and the outboard bearing, thereby practically eliminating chance of misalignment. Pump discharge may be turned to any one of eight directions. Each pump is connected to the engine through a rubber-bushed flexible coupling which requires no lubrication, has no external parts on which clothing can be caught, and is noiseless.

A New Bulletin on Plow Scrapers

The Garst Manufacturing Company has issued a booklet giving the development of its power Plow Scrapers. In this the scraper is described as essentially a right-hand plow and a left-hand plow joined together at the back and covered with a top. This scraper digs only until it is loaded after which it travels with a minimum pull.

What's New with Waukesha?

The Waukesha Motor Company is distributing an illustrated 20 page Bulletin under the heading, "What's New with Waukesha?" The pages of the Bulletin are largely devoted to describing the new engines and power units, developed during 1928. The new plant extension has increased the floor area 100 per cent, giving additional production facilities for both the new engines and those which it has been building for many years. The adequate service department facilities include greater stocks and guarantee prompt shipments.

Bucyrus-Erie Moves Chicago Office

The Bucyrus-Erie Company's Chicago office has been moved to room 1312, Bankers Building, at 105 W. Adams Street. Its complete line will be handled by A. R. Hance and W. K. Fawcett.

New Type of Quarry Car

The Easton Car and Construction Company has put upon the market a new type of railroad car that is particularly adapted to large quarry operations. As shown in the cut, this car has two sets of standard-gauge trucks and two distinct but equal bodies. It is known as the Duplex Phoenix car. Each body has a capacity of ten cubic yards. The car conforms strictly to American Railway Association requirements, with full-size automatic couplers, friction draft gears, and Westinghouse air brakes.

The car bodies are dumped by an arrangement either in the form of a compressed air or an electric hoist which is automatic in action and which can, when desired, be remotely controlled. The car is a perfect unit for any pit or quarry.

Double-Body Quarry Car

Rates for display advertisements in the Broadcast Section are given below. If you want to buy or sell used equipment, if you want a job or need a man, advertise your wants in Pit and Quarry. Advertisement copy for publication in the next issue should reach our office within one week after the date of this issue.

RATES PER INSERTION	1 Inch	2 Inches	3 Inches	4 Inches	5 Inches	6 Inches	8 Inches	9 Inches	10 Inches	12 Inches	15 Inches	20 Inches	30 Inches
1 Insertion	$ 3.75	$ 7.25	$10.75	$14.25	$17.75	$ 21.25	$28.25	$31.75	$35.25	$42.25	$56.25	$70.25	$105.00
2 Insertions	3.75	7.25	10.70	14.20	17.65	21.15	28.15	31.65	35.15	42.15	56.15	70.00	104.00
3 Insertions	3.75	7.20	10.65	14.15	17.55	21.05	28.05	31.55	35.10	42.05	56.05	69.75	103.00
4 Insertions	3.70	7.15	10.60	14.10	17.45	20.95	27.95	31.45	35.00	41.95	55.90	68.75	101.00
8 Insertions	3.65	7.05	10.50	14.00	17.25	20.75	27.75	31.25	34.80	41.75	55.70	67.50	98.00
13 Insertions	3.60	6.95	10.40	13.90	17.05	20.55	27.55	31.05	34.60	41.55	55.55	66.25	94.00
26 Insertions	3.50	6.75	10.20	13.70	13.65	20.05	27.05	30.65	34.20	41.05	55.05	64.00	88.00

INFORMATION—"Broadcast" space is sold by the advertising "inch." Each page contains 30 inches. The width of the page is divided into 3 columns, each 2¼ inches wide. Each column contains 10 inches measured the length of the column. Any space may be used measured by the *even* inch in height (not fractions), by 1, 2 or 3 columns in width. The size of a space is its height in inches multiplied by the number of columns in width. Example: a space 3 inches high by 2 columns wide is 6 inches. Copy changes made without additional charge.

It Pays to Advertise in PIT AND QUARRY

The results obtained from the advertisement which we recently had inserted in PIT AND QUARRY have been highly satisfactory. We have had several replies from equipment companies offering us equipment exactly as wanted, or that was very near what we required, and among the various offers we have secured just what we wanted.
We highly recommend to any firm in our line, or a similar line of business, which is in need of used equipment, the advertising pages of PIT AND QUARRY for obtaining prompt results. —Peerless Quarries, Inc., Oriskany Falls, N. Y.

Complete Service Publishing Company

538 South Clark Street CHICAGO

Machinery for Sale

SPECIALS
1—8-Roll Bradley Mill.
1—No. 6 Williams Universal Hammer Mill

CRUSHERS

Crushing Rolls

1—8″x5″, 4—24″x12″, 1—26″x15″, 1—30″x10″, 1—30″x16″, 2—36″x16″, 2—42″x16″, 1—54″x24″.

Gyratory

All sizes from No. 2 Reduction to No. 12K.

Jaw

1—2″x6″, 1—6″x3″, 2—8″x10″, 1—6″x15″, 2—9″x15″, 1—11″x22″, 2—12″x24″, 1—18″x36″, 1—42″x40″.

Rotary

Two No. 0, two No. 1, one No. 1½, and one No. 2 Sturtevant Rotary Fine Crushers.

Ring Roll

One No. 1 and one No. 2 Duplex Sturtevant ring roll mills.

Ball and Tube Mills

3′, 4′, 4½′, 5′, 5½′, 6′, 8′ Hardinge Mills and Tube Mills.

DRYERS

One 3′x30′, Three 4′x30′, One 4½′x30′, One 5′x40′, One 5½′x40′, One 6′x60′, One 7′x60′ and One 8′x80′ Direct Heat Rotary Dryers, One 5′x25′, One 6′x30′, Two 8′x80′ Ruggles Coles type "A" and One 5′x30′ indirect heat rotary dryer.

KILNS

3′x15′, 4½′x36′, 6′x60′, 6′x70′, 6′x100′, 6′x120′; 1—4½′ Bruckner Roasting Furnace.

MILLS

Two 33″ and two 42″ Fuller Lehigh Mills.
1 No. 0000, 1 No. 00, 2 No. 1, 2—4 Roll, and 1—5 Roll Raymond.
Swing Hammer Mills, Griffin Mills, Attrition and Cage Mills.
Air separators, Screens, Elevators and Conveyors, Sand Washers and Classifiers.

The Heineken Engineering Corp.
Industrial Engineers
117 Liberty St., New York City
Courtlandt 5120

CRANES

1—15-ton cap. LINK-BELT, K-42 GASOLINE Crawler, New 1927, 95 HP Waukesha Motor, 50 ft. Boom, 1-yd. C. S. Bucket, Excellent cond.
1—15-ton cap. NORTHWEST, Model No. 104, GASOLINE Crawler, New 1928, 7¼x9 Twin City Motor, 50 ft. Boom, Bucket operating, Like new.
1—15-ton cap. P. & H., Model No. 700, GASOLINE Crawler, New late 1927, 95 H. P. Waukesha Motor, 50′ Bm. Drag. attachment, almost new.

SHOVELS

1—LORAIN 75; GASOLINE crawler, New 1927, ALL STEEL CENTER DRIVE CRAWLERS; 1¼-yd. Dipper; HIGH LIFT; Like New.
1—ERIE B-2 DREADNAUGHT, Steam Crawler, Shop No. 3700, New 1926, ALL STEEL CRAWLERS; 1-yd., HIGH LIFT; Completely re-built, Like new.

GREY STEEL PRODUCTS COMPANY
111 Broadway New York City

CRUSHERS

Traylor Jaw 36x42″ Mang. fitted.
Gates Gyratory, 12-K, 12-N.
McCully Gyratory No. 8, 5, 4, and 3.
Telsmith No. 4 and No. 2-F Reduction.
Kennedy gearless No. 37 Reduction.
Austin No. 10 and No. 5 gyratory.
Good Roads 10x20 portable & 10x20 on Skids.
Jaw Crushers, 7x15, 9x15, 12x24, 18x24.
Universal Jaw crusher 8x18.
Allis Chalmers Gates 7½-K and 6.
Symons Disc 48″, 36″ and 24″.
Sturtevant No. 1½ Rotary Fine Crusher.
Jeffrey Hammer Mill type A, 36x24″.
Farrel Jaw 30x13 Type 10-B.
Stephens-Adamson all Steel Bucket Elevator.
Stephens-Adamson Pan Conveyor.
Screens 48x20″, 48x16′, 40x12′.
Crushing Rolls various Sizes.
OTHER CRUSHERS, SCREENS AND CONVEYORS.

CRANES, SHOVELS AND DRAGS

Northwest 105 Combination ¾ yd.
Universal Power Shovel, Gas, Cat. ¼ yd.
Byers Combination Shovel and Crane ½yd.
Marion 31 Cat. 1¼ yd. low price.
Bucyrus Cl. 14 Cat. Dragline 80′ boom, 2 yd.
Bucyrus Cl. 24 Dragline electric 100′ Boom.
Speeder ½ yd. Gas. Cat. Shovel.
Byers Bearcat Crane 28′ Boom, low price.
Universal Truck Crane ½yd.
Byers Truck Crane 30′ Boom, ¾ yd.
Bucyrus Shovel 80-B Cat. 2yd.
Other makes and sizes on hand.
COMPRESSORS, CARS, LOCOMOTIVES, BOILERS AND POWER EQUIPMENT

F. MAYER

53 W. Jackson Blvd., Chicago, Ill.

CLAM SHELL BUCKETS

2 Hayward 2 yd. cap. Class E
2 Williams 1½ yd. cap. Hercules
3 Hayward 1¼ yd. cap. Class E

DUMP CARS

4 K & J 4 yd. cap. 36 in. ga.
10 Western 6 yd. cap. std. ga.

FLAT CARS

2—80000 lb. cap. std. ga. 36 ft. long
2—20000 lb. cap. std. ga. 15 ft. long

HOISTS

1—50 HP O&S single drum A.C. electric
1—15 HP Lidgerwood single drum A.C. elec.
4—7 by 10 A H & D D C D D
2—3 by 7 and 6¼ by 8 geared swingers
1—10 by 12 Flory D D cableway unit

LOCOMOTIVES

1—25 ton Vulcan std. ga. steam
1—20 ton Vulcan std. ga. steam
3—7 ton Midwest std. ga. gas
1—4 ton Midwest 24 in. ga. gas

WELL DRILL

1 Cyclone No. 14 gasoline operated.

Send for List 17 showing Other available equipment

UNITED ENGINEERS & CONSTRUCTORS INC.
Surplus Equipment Department
Philadelphia, Penna.

DERRICKS

2—35 ton Steel Guy 110′ Masts.
1—15 ton Timber, 70′ steel boom.
1—10 ton All-Steel Stiffleg, 75 ft. boom.
1—10 ton wooden stiffleg, 90 ft. boom, 3 line.
4—5 ton 50 and 60′ boom steel stiffleg.

HOISTING ENGINES

1—10x12 DD Lidgerwood Boiler Mounted
1—60 HP National 3-Drum Elec. with Swinger
2—30 HP Lidgerwood DD Elec.

GANTRY CRANES

2—Link-Belt Tower mounted, 90′ boom, steam operated full revolving Gantry cranes, mounted on 30′ towers

GASOLINE SHOVELS AND CRANES

1¼ yd. Lorain 75
1—1 cu. yd. Osgood Shovel.
1—1 cu. yd. Link Belt Combination
1—Model 105 Northwest Crane 40′ boom.

STEAM SHOVELS

1—Marion 37 Cat. 1¾ yd. dipper
1—Marion 32 Cat. 1¼ yd. dipper

GASOLINE LOCOMOTIVES

1—8 ton Plymouth 36″ ga.
1—12 ton Whitcomb standard gauge.

AIR COMPRESSORS

2—100 cu. ft. Chicago Pneumatic Portable Gasoline.
1—599 cu. ft. Ingersoll Rand Short Belt Drive 104 HP 3 phase, 60 cy., 440 volt motor.
2—240 cu. ft. Penna. Motor Driven 40 HP 3 ph. 60 cy. 220/440 vs.
1—210 cu. ft. Chicago Pneumatic Portable Gasoline.

B. M. WEISS
1234 Widener Bldg., Philadelphia, Pa.

3 PLANTS and CONOWINGO

BUCKETS

57—Clamshell Buckets, sizes from ½ yd. to 2 yd. Following makes; Blaw-Knox, Byers, Haiss, Hayward, Kiesler, Lakewood, McMyler, Owens, Standard and Williams, and 1—1½ yd. Pioneer slack line; 1—1½ yd. Green drag scraper; 1—⅞ yd. Green drag scraper.

CARS

8—K & J 6 yd. Standard Gauge Dump Cars.
95—5 yd. 36-in. gauge Dump Cars, Western and Koppel, 80 with steel underframes. A number of flat cars, with standard gauge and 24-in. gauge. Several Easton 75 cu. ft. capacity, standard gauge, all steel one-way side dump cars.
5—Continental heavy duty 5-yd. 36-in. gauge Cars, steel lined body.

COMPRESSORS

2—Steam Driven Compressors, 1—Sullivan, 1500 ft., 1—Sullivan, 950 ft. Both high pressure.
1—Ingersoll-Rand, size 14x9x12, Imperial Type 10, with intercooler, rated 374 ft. at 100 lbs. with pulley for belt drive.
1—Ingersoll-Rand Duplex, single stage, size 16x14, rated 1,198 cu. ft. at 30 lbs. pressure.

CONVEYORS AND ELEVATORS

3—Belt Conveyors, belts 20 to 42 in., 120 to 500 ft. lengths.
4—Link-Belt Bucket Elevators, 12-in.x7-in. buckets, 2—82 ft. centers, 2—76 ft. centers.

CRANES

2—Northwest's, Model 104, on full crawlers with 40 ft. crane booms, one with shovel attachment.
1—Link-Belt gasoline, on full crawlers; Model K1 10-ton with 50-ft. boom.
1—Byers Bear Cat Gasoline Crane with 26-ft. boom. Factory rebuilt in 1927.
1—Austin Simplex gasoline, on full crawlers, 30 ft. boom. 7 ton cap.
1—Byers Model 10 Steam on half crawlers with 30-ft. boom.
1—Byers Auto Crane on traction wheels with 30-ft. boom (steam).
2—Type "B" Erie Crane or Dragline with 40-ft. boom and ¾-yd. bucket, also with steam shovel boom and ¾-yd. dipper. Shop Nos. 3900 and 3047.

DRILLS

241—Air Drills and Jackhammers including Ingersoll-Rand; Chicago Pneumatic Tool and Independent Pneumatic Tool—Jackhammers, Air Spades; Wood Borers and Riveting Hammers.

DERRICKS (Steel)

1—American 20-ton, 100-ft. boom, 50-ft. mast, with legs and sills, 20-ft. bullwheel.
5—American with 80-ft. boom, 40-ft. mast, with stiff legs and sills, 16-ft. bullwheel (steel).

LOCOMOTIVES (Steam)

8—Standard Gauge Locomotives: 1—American 15x20, 42 ton, saddle tank, type 040, Shop No. 64238; 2—Davenport 12x16, 25-ton saddle tank, type 040, Shop Nos. 2070 and 2076; 1—Porter 12x16, 24 ton, saddle tank, type 040, Shop No. 5093; 2—Vulcan 11x16, 21 ton, saddle tank, type 040, Shop Nos. 3580 and 3676; 2—Vulcan 11x16, 20 ton, saddle tank, type 040, Shop Nos. 1417 and 2159.
2—Vulcan 36-in. Gauge Steam Locomotives, 9x14, 15 ton, saddle tank, type 040, Shop Nos. 3383 and 3425.

SAND PUMPS

1—12-in. Morris Manganese, direct connected to 300 hp. A.C. motor.
6—Belt driven; one 10-in. Morris manganese; one 8-in. Morris manganese; one 6-in. Morris manganese; two 6-in. Morris; one 6-in. Erie; one 4-in. Morris.
1—6-in. Erie Silent Chain Driven with 4 cyl. gasoline engine.
1—6-in. Morris direct connected to 50-hp. A.C. motor.

SHOVELS (Steam)

1—Marion Standard Gauge R.R. Shovel, Model 60, Shop No. 2225, with 2½ cu. yd. dipper.
1—Marion, Model 21, on crawlers, ¾-yd. dipper, Shop No. 4916.
2—Type B Erie, fully revolving, ¾-yd. dipper, on crawlers, Shop Nos. 3900 and 3047.
1—Type 37 Marion, full revolving steam shovels on crawlers, 1¾-yd. dipper, Shop No. 5308.

Send for list of Conowingo Equipment and our latest Stock List containing our complete Stock in our Chicago, Philadelphia and Pittsburgh Plants

EQUIPMENT CORPORATION OF AMERICA

PHILADELPHIA
660 Horn Bldg., 1601 Chestnut St.
Phone Rittenhouse 6100

CHICAGO
1160 S. Washtenaw Ave.
Phone Seeley 5100

PITTSBURGH
860 Empire Bldg.
Phone Grant 6100

Conowingo, Md.
Box 86

POWER EQUIPMENT

Partial List of Stock

"ROCKFORD REBUILT"

ENGINE-GENERATORS
Alternating Current
3 PH.—60 Cy.—220/440 2300 Volt

50 KW Gen. Elec. type ATB 300 RPM generator direct connected to 10x12 Brownell single slide valve engine.
75 KW Gen. Elec. type ATB 225 RPM .8 PF new generator direct connected to 15x16 Chuse single slide valve engine.
125 KW Westinghouse 225 RPM generator direct connected to 11x18 and 17½x18 Buckeye Tandem compound engine.
240 KW Gen. Elec. 200 RPM generator direct connected to 20x22 Ironton engine.

Direct Current—250 Volts

50 KW Crocker Wheeler type CCD 275 RPM generator direct connected to Chandler Taylor engine.

Synchronous Motor

50 HP 1200 RPM, 3 Ph., 60 Cy., 220/440 Volt Ridgway with direct connected exciter.

Synchronous Converters

100 KW Gen. Elec. Compound wound type TC 1200 RPM 600-Volt DC complete with three 35 KVA 2300-volt transformers and two panel switchboard for AC and DC control.
200 KW Gen. Elec. compound wound type HCC 1200 RPM 240/300-volt DC—practically new—no transformers or switchboard.

Synchronous Motor Generator Set

150 KW Westinghouse 125/250-volt, 3 wire, 600 amp. 580 RPM, DC generator direct connected to 225 HP, 600 RPM, 3 ph. 60 cy. 220/440-volt Westinghouse synchronous motor.

AIR COMPRESSORS

Several late type Ingersoll-Rand and Worthington machines, both single and two stage, available for immediate shipment. Also a large stock of transformers, pumps, and generators, all listed in Bulletin No. 35—Send for your copy.

"ROCKFORD REBUILT"

Not a mere phrase, but a statement that is rapidly being recognized by careful buyers of used equipment as being synonymous with "Reliable Merchandise at Reasonable Cost." This is best evidenced by our ever increasing list of new customers who fully appreciate the meaning of our ONE YEAR GUARANTEE.

All apparatus thoroughly overhauled and reconditioned before shipment, guaranteed to be free from electrical or mechanical defects.

Try a "Rockford Rebuilt" unit on your next installation, the results will be mutually pleasing.

Rockford Power Machinery Company

"Everything in Motors"

620-626 Sixth Street ROCKFORD, ILL.

POWER EQUIPMENT

Partial List of Stock

"ROCKFORD REBUILT"

TURBO-GENERATORS
Alternating Current
3 Phase—60 Cycle—220/440 Volt

62½ KVA Westinghouse unit. Generator geared to non-condensing turbine.
187 KVA Westinghouse unit. Generator direct connected to non-condensing turbine.
500 KVA Westinghouse unit. Generator direct connected to mixed pressure turbine.

Direct Current

150 KW Westinghouse unit. 125/250-volt DC 3 wire generator geared to non-condensing turbine, with switchboard.

Engines

25 H. P. Fairbanks Morse type Y crude oil complete with fuel tank, muffler, friction clutch and pulley.

Motor Generator Set

20 KW 125 Volt, DC General Electric generator, direct connected on common base to 30 HP-900 RPM, 3 Ph., 60 Cy., 220/440 Volt, Gen. Elec. motor.

SLIP RING MOTORS
3-Ph.—60-Cy.—220/440-Volt

1½	HP	1200 RPM	Gen. Elec.	MT
2	HP	900 RPM	Gen. Elec.	MT
3	HP	1200 RPM	Gen. Elec.	MT
7½	HP	1200 RPM	Gen. Elec.	MT
10	HP	1200 RPM	Gen. Elec.	MT
15	HP	1200 RPM	Westinghouse	
20	HP	900 RPM	Westinghouse	
25	HP	900 RPM	Gen. Elec.	MT
40	HP	1200 RPM	Westinghouse	
50	HP	900 RPM	Gen. Elec.	I
75	HP	900 RPM	Gen. Elec.	I
75	HP	720 RPM	Gen. Elec.	I
100	HP	720 RPM	Gen. Elec.	I
150	HP	514 RPM	Gen. Elec.	I

MOTORS

Hundreds of machines AC and DC, all types squirrel cage, slip ring, synchronous, etc., available for immediate shipment. All listed in Bulletin No. 35. Send for your copy—mailed free on request.

FOR SALE OR RENT

DERRICKS

20—American timber stiff leg derricks, 14x14" timbers, 50' to 75' booms 12' all steel bull wheels for 2 or 3 line service.

7—Terry wood stiff derricks.

1—Lambert stiff leg 16" mast—65' boom, 3-line service.

1—Terry & Tench steel derricks, 86' mast, 76' boom, 15 ton capacity, 14' bullwheel. Several Jiniwinks and small derricks, 30' to 50' booms.

75-ton 3 Line Steel Stiff Leg Derrick.
64' Sills.
64' Mast.
100' Boom.
Double Lattice Construction.
18' Channel Bull Wheel.

1—Monighan Revolving Drag line derrick 100' Boom, 3 cu. yd. bucket; steam.

WE BUILD TO YOUR SPECIFICATION, REGARDLESS OF SIZE OR CAPACITY REQUIRED

GASOLINE HOISTS

1—15 hp. Lidgerwood Utility Double Drum.

2—35 hp. American Double Drum and Swinger. The above can be furnished with electric or gasoline motors. Several small single drum gasoline units from 5 to 15 hp.

STEAM HOISTS

1—12x12 Lidgerwood Double Drum heavy double V-type brake bands specially suited to drag-line service.

3—10x12 Twin drum coal hoists.

1—12x12 Lidgerwood 4-drum Independent Winch Head.

5—7x10 Double drum with swinger, with or without boiler.

8—Lidgerwood single drum skelotons, various sizes.

8—Holding or dumping drums for clam shell bucket service.

2—9x10 Mead Morrison Triple Drum.

2—8½x13 Mundy Double Drum.

2—Haiss D.D. 10x12 Coal Hoists for mast and gaff service.

SWINGERS

4—Clyde electric swingers AC or DC motors.

1—6x8 Clyde Independent.

3—4½x6 Mead-Morrison.

CRANES

1—25-ton Industrial Double Drum Locomotive Crane. 8 wheel MCB equipment, ASME boiler 50' boom.

1—Byers Autocrane, on traction wheels, gasoline or electrically operated, 25' boom, ½-yd. bucket.

1—Buffalo 10-ton 4 wheel, std gauge, 35' boom double drum for bucket service.

2—Brown Hoists—Gantry Cranes, steam.

2—Northwest Crawlers.

1—1¼ Marion Steam Shovel.

COMPRESSORS

1—Ingersoll-Rand Portable Compressor, 210' gasoline driven.

1—Chicago Pneumatic Portable Compressor, 210 gasoline driven.

Metropolitan Representative for Metalweld-Worthington Compressors.

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H&B BINS

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NEW YORK

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SERVICE TO

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YARD—374 KENT AVE., BROOKLYN, N. Y.

A FRACTIONAL H P MOTOR OR A COMPLETE POWER PLANT

Save 35 to 60%

BUY PROPERLY REBUILT ELECTRICAL POWER EQUIPMENT. EVERY MACHINE COMPLETELY RE-MANUFACTURED and TESTED.

FULLY GUARANTEED

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East 53rd & Silver Plate Switch
Cleveland, Ohio

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Gregory Hi-Grade-Rebuilt Electrical Machinery is shipped on approval so that the buyer may determine its fitness by actual trial under real working conditions in his own plant.

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General Electric and Westinghouse Squirrel Cage and Slip Ring Motors, 50 to 200 horse power.

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EQUAL TO NEW
—GUARANTEED

Send Us Your List of Requirements and Surplus Equipment

R. SCHEINERT
Almond and Hagert Streets
Philadelphia, Pa.

FOR SALE - - EQUIPMENT

1—Traction Wheel Erie Steam Shovel, Shop No. 1675, and ¾-yd. Bucket	$1500.00
1—American Locomotive—36-in. Gauge, 20-ton, No. 41738	500.00
4—36-in. Gauge Side Dump Cars	50.00
1—Webster Bucket Loader	200.00
1—¾-yd. Williams Clamshell Bucket	400.00
1—¾-yd. Dragline Bucket	250.00
1—Sauerman 2-yd. Dragline, practically new, Electric power, could use gas power	4,000.00
3—Sand Settling Tanks	15.00
4—Gilbert Screens, including head, shaft and bearings	25.00
1—Ohio 8-Wheel Locomotive Crane, 20-ton, 50-ft. boom, shop No. 569, including ¾-yd. Bucket	3,000.00
1—Austin No. 4 Gyratory Crusher No. 3191	500.00
Parts to make Erie Traction Wheel Shovel into R. R. Track Shovel	100.00
1—Barber-Greene Bucket Loader, Model No. 42, Shop No. 23090	1500.00
1—Erie steam shovel boom and dipper stick with crowding engine	300.00
1—Erie Gas Air Shovel boom and stick with crowding engine	500.00
1—2-yd. Dragline Bucket	700.00
1—Telsmith Screw Sand Auger	400.00

GRAND RAPIDS GRAVEL CO.

329 Michigan Trust Bldg., - Grand Rapids, Mich.

BARGAINS

1—2-yd. Page Dragline, Walker type with 2-yd. Page Bucket, Shop No. 133, new August 1927, one year service. Splendid condition.
40-ft. crane boom.

1—8-in. Horizontal Centrifugal Pump. Direct connected to 50-hp. Motor. 1400 gal. 70-ft. head.

WALTER S. ANDERSON
6727 Euclid Ave., Chicago, Ill. Tel. Hyde Park 9126

FOR SALE
DRAG SCRAPER OUTFIT

A 3-drum hoist with 120 HP Beaver 6 cylinder motor, 2—1½ yd. drag scraper buckets together with cable blocks. etc. P. & H. model 206. cat. gas machine equipped as shovel and dragline. 12—Western 1½ yd. 24 in. ga. dump cars. Some track and 2 Milwaukee 7 ton gas locos.

LEONARD F. SMITH
La Porte, Ind.

Rebuilt Equipment

For Sale or Rent

LOCOMOTIVES

1—Std. ga. 17x24 Davenport, 6-wheeled Switcher, Shop No. 1492, wt. 47 tons.
2—Std. ga. 14x22 American 4-wheeled S.T., Shop Nos. 42768 and 50372, wt. 38 tons.
1—Std. Ga. 14x20 Vulcan 4-wheeled Saddle Tank, Shop No. 1705, weight 37½ tons.
1—Std. ga. 13x18 Vulcan, 4-wheeled Saddle Tank, Shop No. 2982, wt. 32½ tons.
1—Std. Gauge 12x16 Davenport Shop No. 2148 4-wheeled Saddle Tank. Weight 25 tons. New.
2—Std. Ga. 11x16 Davenports, wt. 21½ tons, A. S. M. E. Nat'l. Bd. Boilers, New.
1—20-ton Std. Gauge Plymouth Gasoline. Air brakes.
2—36 in. Ga. 11x16 Davenports, wt. 21½ tons, A. S. M. E. Nat'l. Bd. Boilers. New.
1—10x16 Davenport, 36-in. gauge, 4-wheeled saddle tank, Shop No. 1918, weight 19½ tons, A.S.M.E. boiler, 170 lbs.
4—36 in. Ga. 12-ton Whitcomb Gasoline, 6-Cyl. Climax Engines. Shop Nos. 11707-8-9 and 89.
1—36-in. ga. 30-ton Climax Locomotive, new 1925.
1—36-in Ga. 9-ton Davenport 4-wheeled Saddle Tank, Shop No. 1567.
2—24-in. ga. 9-ton Davenport & Vulcan Saddle Tanks.

SIDE DUMP CARS

11—20-yd. Western, all steel.
3—18-yd. Western, all steel.
34—16-yd. Western wood beds, air dump.
44—12-yd. Western side dump, wood beds.
2—8-yd. Stand. Gauge, K&J Steel Beam, wood beds.
52—6-yd. K. & J. Steel sills Truss-rod doors.
14—4-yd. K. & J. 36-in. ga. wood sills.
10—4-yd. Western, 36-in. gauge, steel sills, steel covered floors.

BUCKETS

¾ to 3½ cu. yd. cap. Clamshell and Dragline.

STEAM SHOVELS—Revolving

1—80-B Bucyrus, steel caterpillars, 48-ft. boom, 30-ft. dipper arm and 2-yd. dipper.
2—50-B Bucyrus, Shop Nos. 4760 and 4949, steel caterpillars, standard boom, 1¾ yd. dipper, ASME boiler.
1—Model 37 Marion, Shop No. 4782, steel caterpillars, high lift boom, 1¼-yard dipper.
1—50-B Bucyrus Electric Combination Shovel and Dragline, Shop No. 4331, steel caterpillars, standard shovel equipment and 50-ft. boom and 1½-yard dragline bucket.
2—20B Bucyrus, Shop Nos. 3748-4137, ¾-yd. capacity, steel caterpillars.
1—Type "B" Erie, Shop No. 1989, high lift, ¾-yd. steel cats.
4—Erie Railroad Steam Ditcher cranes, 36-ft. booms, ¾yd. clamshell buckets.
1—Type O Thew, Shop No. 1777, high-lift, traction wheels. 2/3-yd. dipper.

STEAM SHOVELS—Railroad

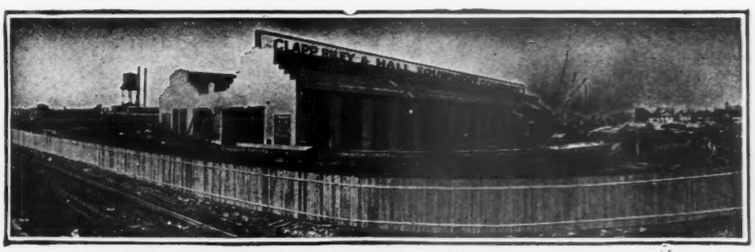
1—Model 80 Marion, Shop No. 1312, 4-yd.
1—88-C Bucyrus, Shop No. 3792, 3-yd. dipper, caterpillar mounting.
1—103-C Bucyrus, Shop No. 3864, 3½-yd. dipper, caterpillar mounting.
2—60-C Bucyrus, Shop Nos. 1286 and 1388, 2½-yd. dipper.
1—Model 60 Marion, Shop No. 2059, 2½-yd. dipper.
2—70-ton Bucyrus, Shop Nos. 920 and 1233, 2½-yd. dippers.

GASOLINE
Shovels, Cranes, Draglines

3—K-2 Link-Belt Shovels, Cranes or Draglines, Shop Nos. 1124, 1130, and 1178, 40-ft. boom, 10-ft. extension, 1-yd. clam shell, 1-yd. shovel dipper.
3—Model 206 P. & H. Shovels, Cranes, Draglines, Shop Nos. 1764, 1821 and 2299. Steel caterpillars, 38-ft. crane boom, Standard shovel boom, ¾-yd. dipper.
2—No. 1 Koehring Crane or Dragline, Shop Nos. 304 and 360, caterpillars, 40-ft. boom, ¾-yd. bucket
3—Model 105 Northwest, Shop Nos. 862, 1063 and 1516, Shovel Crane or Dragline, 40-ft. booms, ¾-yd. buckets.

SAND, Gravel and Quarry operators have been buying and renting equipment from us for nearly half a century. They come for equipment with full knowledge and confidence that machinery purchased or rented will stand up under the most trying condition. **Every piece of equipment rebuilt in our shops is sold with the following positive guarantee:**

OUR GUARANTEE All equipment overhauled in our Shops is guaranteed subject to thorough trial in service. Only part of the purchase price is required upon shipment, the remainder being payable after the purchaser has had an opportunity of testing the equipment in actual service. If the equipment does not prove entirely satisfactory and as represented by us in every respect we will either correct any defects, or the equipment can be returned to us at the end of the trial period and we will refund the purchase money paid, in full.



Our Chicago rebuilding plant and yard occupying twelve acres is only seven miles from the downtown district. It contains 8,000 feet of storage track and over 75,000 square feet under roof.

Shovels, Cranes and Draglines—Continued

2—Model 104 Northwest Shovels, Cranes or Draglines, Shop Nos. 986 and 1173; 40-ft. boom with 5-ft. extension, 1-yd. bucket, Standard shovel equipment, 1-yd. dipper.
1—Model 210 P & H Dragline, Shop No. 1077, 40 or 50-ft. boom, 1-yd. dragline bucket, armored caterpillars.
1—Erie Gas-Air Shovel, Shop No. 3663. Steel caterpillars. Standard boom, 1-yd. dipper.

CRANES

2—50-B Bucyrus, Shop Nos. 4760 and 4949, steel caterpillars, 50-ft. boom, bucket operating drums, A.S.M.E. boiler.
1—Model 37 Marion, Shop No. 4782, steel caterpillars, 50-ft. boom, bucket operating.
1—50-B Bucyrus Electric, Shop No. 4331, steel caterpillars, 50-ft. boom, bucket operating, Cutler-Hammer control.
1—30-B Bucyrus, Shop No. 3922, steam-operated, steel caterpillars, 40-ft. boom, 1-yd. bucket.
1—20-ton McMyler, No. 388, 50-ft. boom, bucket operating.
1—25-ton Browning, Shop No. 2031, 8-wheel, 50-ft. boom, bucket-operating drums.
1—15-ton Brownhoist 8-wheeled Crane, Shop No. 4520.
1—Dock Crane, bucket operating, 50-ft. boom, 7-ft. 10-in. gauge, 12-ft. wheelbase, capacity 15 tons at 18-ft. radius.

SHOVEL PARTS

High Lift Shovel Boom and Dipper Arm with 1½-yd. Dipper for Model 37 Marion.
All repair parts on hand for Model 60 Marion and standard 70-ton Bucyrus Steam Shovels.
2—Complete Shovel Attachments for K-2, Link-Belt, 1-yd. dipper.
Parts for Type B Erie.

DRAGLINE EXCAVATORS

2—50-B Bucyrus, Shop Nos. 4760 and 4949, steel caterpillars, 50-ft. boom, 1¼-yd. Page bucket, A.S.M.E. boiler.
1—30-B Bucyrus, shop No. 3922, steel caterpillar, 40-ft. boom, 1-yd. Page bucket.
2—Model 220 Page, Shop Nos. 109 and 110, 72-ft. booms, 2½-yd. Page buckets, 100 hp. Charter Oil Engines, mounted on tandem trucks.
1—Class 14 Bucyrus, shop No. 2140, steam operated, armoured caterpillars, 60 ft. boom, 2 yd. Page bucket.

SPREADER CARS

1—Standard Gauge Jordan, all steel, 100,000 lbs.
1—Standard Gauge Western, wood.
1—36-in. Ga. Western Wood.

MISCELLANEOUS

1—5-ton Holt Tractor with Bulldozer.
13—1½-yd. Western, Streich and Stroud Dump Wagons.
1—No. 55 Buhl Portable Air Compressor.
7—90-C Buhl Portable Air Compressors.
1—100 FD Buhl Fordson Unit.
2—160-Y Buhl Portable Air Compressors.
1—180-C Buhl Portable Air Compressor.
1—Size "G" California Vulcan Sheeting Hammer. Wt. 750 lb.
1—No. 3 McKiernan-Terry Sheeting Hammer—625 lbs.
1—No. 7-S Knickerbocker Concrete Mixer, with power loader and water tank on trucks. New.
25—Milburn Carbide Lights.
1—Model 10 Keystone Mixer, low charger, 6-hp. Novo Gas Engine.
1—7x8 Gould Triplex Pump, belt driven.
3—Thomas, single drum electric hoists with motors and starters.
1—Austin New Era Elevating Grader.
1—5-Ton Galion Gasoline Roller. Shop No. 795.
2—10-Ton Buffalo Springfield Steam Rollers. Shop Nos. 10049 and 10707.
2—12-Ton Buffalo-Springfield Gasoline Rollers. Shop Nos. 10815 and 11515.
3—12-Ton Galion Gasoline Rollers. Shop Nos. 331, 536 and 803.

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16 NORTH CLINTON ST., CHICAGO, ILL.
(PHONE FRANKLIN 4028)
WORKS: CLYDE, ILL.

458 UNION TRUST BLDG., PITTSBURGH, PA.
(PHONE ATLANTIC 4643)
WORKS: NEVILLE ISLAND, PA.

FOR SALE

ELECTRIC SHOVELS

1—175-B Bucyrus Electric Dragline and Shovel. 3½-yard dipper, shop number 794, 3 phase, 60 cycle, 440 volt, shovel boom 87 feet, drag boom 125 feet.
2—35-B Bucyrus Full Revolving 1½ yard dipper, 3 phase, 60 cycles, 440 Volts.

STEAM SHOVELS

1—70-C Bucyrus Railroad Type, 2½ or 3 yard dipper, shop number 1672.
3—70-C Bucyrus Caterpillar (with railroad trucks) 2½ or 3 yard dipper, shop numbers 1671-1710.
3—18-B Bucyrus Full Revolving Caterpillar ⅞ yard dipper, shop numbers 1751, 1752, 1762.
1—Model 36 Marion Revolving Caterpillar Steam Shovel, 1½ yard dipper, shop number 4735.

LOCOMOTIVES

1— 9x14 Vulcan Saddle Tank, 36-inch gauge.
1—10x14 Vulcan Saddle Tank, 36-inch gauge.
29—11x16 Vulcan Saddle Tank, 36-inch gauge.
2—12x16 Vulcan Saddle Tank, 36-inch gauge.

SIDE DUMP CARS

Heavy Duty

20—8 yd. Kerbaugh 2 way Steel Trucks.
28—8 yd. Western 2 way Steel Trucks.
5—4 yd. Western 2 way Steel Trucks.
34—4 yd. Kopple 2 way Steel Trucks.

BOILERS

1—Locomotive Type. Will fit any 11x16 Vulcan Locomotive.
3—Locomotive Type on wheels. 50 H. P. Capacity.
1—Vertical 54"x8' high Johnson Bros.
1—Vertical 48"x10'9" high International.
1—Vertical 48"x8' High Johnson Bros.

WOOD TANKS

2—10,000 Gal. Fir.
6—30,000 Gal. Fir.
1— 4,000 Gal. Fir.

PUMPS

3—Allis-Chalmers 2"—75 GPM Centrifugal, 10 HP Motor AC.
1—Cameron 3"—300 GPM Centrifugal, 15 HP Motor AC
1—Aldrich Triplex 100 GPM, 5 HP Motor AC, Silent Chain Drive.
1—Cameron 3"—300 GPM, 15 HP Motor AC, Centrifugal.
1—Goyne No. 2—300 GPM Centritugal, 15 HP Motor AC.
1—Goulds Triplex 7x9—200 GPM, 10 HP Motor AC.
1—Goyne 5" Double Suction Centrifugal 1000 GPM direct connected to 50 HP, G. E. Motor AC.
1—Barrett-Haentjens 5" Double Suction Centrifugal 1000 GPM direct connected to 40 HP, G. E. Motor AC.
1—Goulds Triplex 3½x4" 50 GPM for Belt Drive.
1—Goulds Triplex 3½x4" with 5 HP, G. E. Motor AC.

DRILLS

1—No. 14 Sanderson Cyclone Drilling Machine, 15 HP Motor AC for 5" to 10" holes, 250' deep.
1—Ingersoll Rand Drill Wagon.
1—Model 21 Denver Rock Drill with Tripod.
3—Model 17 Gardner Denver Rock Drills.
5—Ingersoll Rand X71 Rock Drills.
2—Ingersoll Rand X70 Rock Drills.

SHOP EQUIPMENT

1—Oster Pipe and Belt Threading Machine No. 304-B for Pipe 1" to 4" Bolts ½" to 1¼"—7½ HP Motor Silent Chain Drive.
1—20" Champion Drill Press Back Geared.
1—36" Radial 5 Speed.
1—Hutchinson Lightning Wood Working Machine No. 2138 Complete with Rip Saw. Cut-off Saw and 6" face planer 5 HP Motor and Starter.
1—Zeus Arc Welding Machine No. 724.
1—Underwood Valor Facing Machine for 11x16" Vulcan Locomotive Valves.
1—Cylinder Boring Machine for 11x16" Locomotive.
1—Grind Stone, 4"x18".
2—No. 3 Excelsior 2 wheel Grinding Machine with 2-14" Carborundum Wheels.
3—Low Pressure Model B-2 Carbic Generators Complete.
4—4' Dia. Blacksmith Forges.
4—350 lb. Haybudden Anvils.

HOISTS

1—Single Friction Drum 48"x36" with 30 HP G. E. Co. Motor and Starter.

AIR COMPRESSORS

1—599 Cu. Ft. Ingersoll Rand Imperial type 10—100 H. P. G. E. Co. Motor 3 Phase, 60 Cycles, 440 Volts.

DRILL SHARPENERS

1—Ingersoll-Rand No. 50 Special Drill Sharpener for 4 Point bits Complete with tools, dollies, dies, etc.
1—Armstrong Model 6 for Gill Pattern Bits complete with dies, dollies, etc. 10 HP Westinghouse Motor 3 phase, 60 cycles, 440 Volt.

Complete Catalog Sent on Request

Locust Mountain Coal Co.
Bethlehem, Pa.

FOR SALE

USED EQUIPMENT

1—886 Ft. Sullivan belt driven air compressor.
2—355 Ft. Ingersoll belt driven air compressor.
1—250 Ft. Chicago Pneumatic steam driven air compressor.
3—210 Ft. Ingersoll portable gasoline driven air compressor.
1—164 Ft. Chicago Pneumatic steam driven air compressor.
1—16" Portable belt conveyor.
1—18" Portable belt conveyor.
1—54 Yard Johnson demountable bin.
2—115 ton Blaw Knox steel batcher bins.
5—9x16 Portable jaw crushers on wheels.
2—14 ton 36" gauge steam saddle tank locomotives.
1—8 ton 24" gauge Whitcomb gasoline locomotive.
3—7 ton standard gauge Midwest gasoline locomotives.
5—7 ton 36" guage Whitcomb gasoline locomotives.
3—4 ton 24" gauge Midwest gasoline locomotives.
1—20 ton standard gauge steam saddle tank locomotive.
1—18 ton 36" gauge steam saddle tank locomotive.
25—Fire box boilers from 25 to 100 H. P.
10—36" gauge 4 yard side dump cars.
8—Clam shell and Orange peel buckets from ¾ yd. to 2 yd. capacity.
1—50 ton standard gauge industrial locomotive crane.
1—25 ton standard gauge Browning locomotive crane.
1—20 ton standard gauge industrial locomotive crane.
2—No. 6 Wiley Whirley 56 ft. radius, 15 ton capacity cranes.
5—No. 75 Wiley Whirley 75 ft. radius, 20 ton capacity cranes.
1—10 ton Lambert steel guide derrick.
1—5 ton Lambert steel guide derrick.
1—Class 14 caterpillar traction steam operated drag line.
1—Class No. 24 Bucyrus electric drag line.
15—One-half yd. 24" gauge Lakewood 2 way side dump cars.
6—6 yard standard gauge Western 2 way side dump cars.
1—5x6 Lidgerwood swinging engine.
1—3x7 Mundy swinging engine.
1—No. 3½ Dake steam swinging engine.
3—5½x8 Lambert D.C.D.D. hoisting engines.
2—7x10 American D.C.D.D. hoisting engines.
3—7x10 American D.C. Triple drum hoisting engine with swingers.
3—8x10 D.C.D.D. hoisting engines.
12—8½x10 Lambert D.C.D.D. hoisting engines.
1—12" Morris Belt driven sand and gravel pump.
1—8" Morris sand and gravel pump.
3—12" Morris centrifugal pumps motor driven.
5—10" Allis Chalmers motor driven centrifugal pumps.
4—6" belt driven centrifugal pumps.
6—5" belt driven centrifugal pumps.
3—4" belt driven centrifugal pumps.
1—4'x12' Rotary screen.
1—1 Yard 100' Lakewood concrete steel tower.
1—180' ¾ yard Insley steel concrete tower.

If your requirements cannot be filled from this list let us have your inquiry as this list covers only a small portion of the equipment that we now have on hand.

E. L. GEE & COMPANY
105 First Ave., South Nashville, Tenn.

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USED—RECONDITIONED—REBUILT

Shovels—Cranes—Draglines
Motor Truck Cranes

$750.00 AND UP

For Sale or Rent—Full rental can apply on purchase price. We will furnish skilled operator to install machine and instruct your employees.

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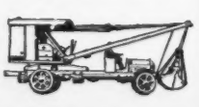

BOILER

1—70 H. P. upright 54" dia. 10', National Board, 125 lbs. steam. Used six months. With shaker grates and all fittings.

CARS

20—¾ yd. V-shape Koppel Cars, 30" gauge.
12—Western 4 yd., 36" gauge, two-way dump cars. Rebuilt.
20—Koppel & Easton 2 yd. 36" gauge, V-Shape rocker dump, heavy duty, low type.
2—Western 12 yd. standard gauge, all steel, hand dump.

PUMPS

Morris 12" Dredge Pump, direct to 300 H. P., A. C. motor. Used two weeks. American Manganese Dredge Pump, 8" suction, 8" discharge, complete with pipe, valves, hose, etc.
Cameron 5" suction, 4" discharge, direct to 30 H. P., A. C. motor. Used 10 days.

PULVERIZERS

1—Penna. SXT6 Hammer Mill, hopper opening 33"x 18".
1—Jeffrey 24x30 swing Hammer Pulverizer, type A.
2—F. L. Smidth Tube Mills, 5'6" x 22'. Silex lined.
1—Sturtevant No. 2 Duplex Ring Roll Mill.
1—Raymond No. 1 with separator, dust collector, etc.
6—Fuller Lehigh Mills, 33", 36" and 42". Three are new, three slightly used.

ELEVATOR

1—Boot Elevator 45'¢ to ¢, 10" buckets, on double chain.

HOISTS

4—Flory and Vulcan double drum dragline Hoists, direct to gasoline and A. C. motors, 25 to 50 H. P.
1—Flory 8¼ x 12, triple drum, friction and reversible, drums, 42" dia. x 38".

GUY DERRICK

1—All steel Guy Derrick, 10 ton capacity, 60' or 70' boom.

SHOVELS

1—Marion Model 36, steam, 1¼ yd.
1—Erie ¾ yd. steam, type B.
Both machines in excellent condition, bargain for quick sale.
1—Erie 1 yd. gas air, used six months.

SHOVEL EQUIPMENT

1—Osgood 40' Crane Boom with Holding Drum.
Large quantity spare parts for Osgood ¾ yd. steam.

CLAM SHELL BUCKET

1—Blaw Knox 2 yd. Dreadnought. Used two weeks on gravel.

JAW CRUSHERS—SPECIALS

Champion No. 6—12x26 and No. 55.
Farrell Type B—13x30.
Reliance 15x30.
Farrell B—9x15, 10x16, 10x20.
Farrell B—18x36, 24x36, 30x42.
Farrell and Buchanan 30x42 and 42x48.

GYRATORY CRUSHERS

McCully No. 3, No. 4 and No. 5.
McCully No. 6 with extra manganese head and shaft.
Gates No. 3, 4-K, 4½-K, 4-D, 6-K, 7½-K, 8-K, 9-K, 10-K, 12-K.

REDUCTION CRUSHER

1—Traylor No. 8 model T Gyratory Reduction Crusher.

ROLL CRUSHERS

1—Set Buchanan Rolls, type C, 16"x36".
1—Set Buchanan Rolls 24"x60". NEW

CRUSHER PARTS

Spare parts for Austin No. 8, Gates No. 5, Kennedy 7½, 9-K Gates, 36" Symons.

A. J. O'NEILL CO.
1524 Chestnut St. Philadelphia, Pa.

Immediate Shipment—Chicago, Ill.

NORTHWEST

104-105 Boom, 40 to 45 ft.; cast steel base; feather touch control; enclosed house; high gantry; late improvements; 1-yd. or ¾-yd. Buckets.

Shop Numbers 2400-1835-1372-717-398.
Have Power Shovel Attachments Dippers Any Size

LINK BELT

Model K1 Crane, Boom 40-foot, full enclosed steel house, also have extra, power shovel attachments, one-yard dipper, serial number 1096. This unit operated about three months during summer months.

P AND H

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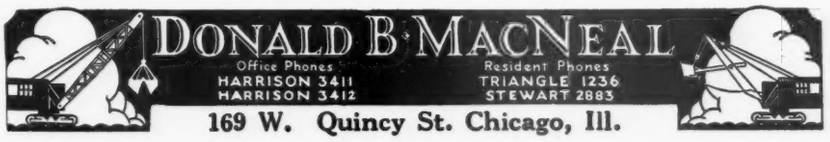

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This body is being sold through dealers in contractors machinery. The man who is selected for the work should be qualified to build an organization of such dealers and keep them working.

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as Quarry Superintendent. Twenty-five years experience in handling crushed lime stone and trap rock quarries. The kind of a proposition that I am looking for is one that in the past has probably not been well managed and that the business could be made to produce more, if properly managed. It is not a question of salary; I would prefer a working interest, or on a tonnage basis. Address Box 102, care of Pit and Quarry, 538 S. Clark St., Chicago, Ill.

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The undersigned will sell or lease Silica Rock Quarry located in Cumberland, Maryland, on main line of Western Maryland Railroad, also branch lines of the Pennsylvania Railroad and Baltimore and Ohio Railroad. Property has been opened and previously worked and can be put in operation with very little expense.

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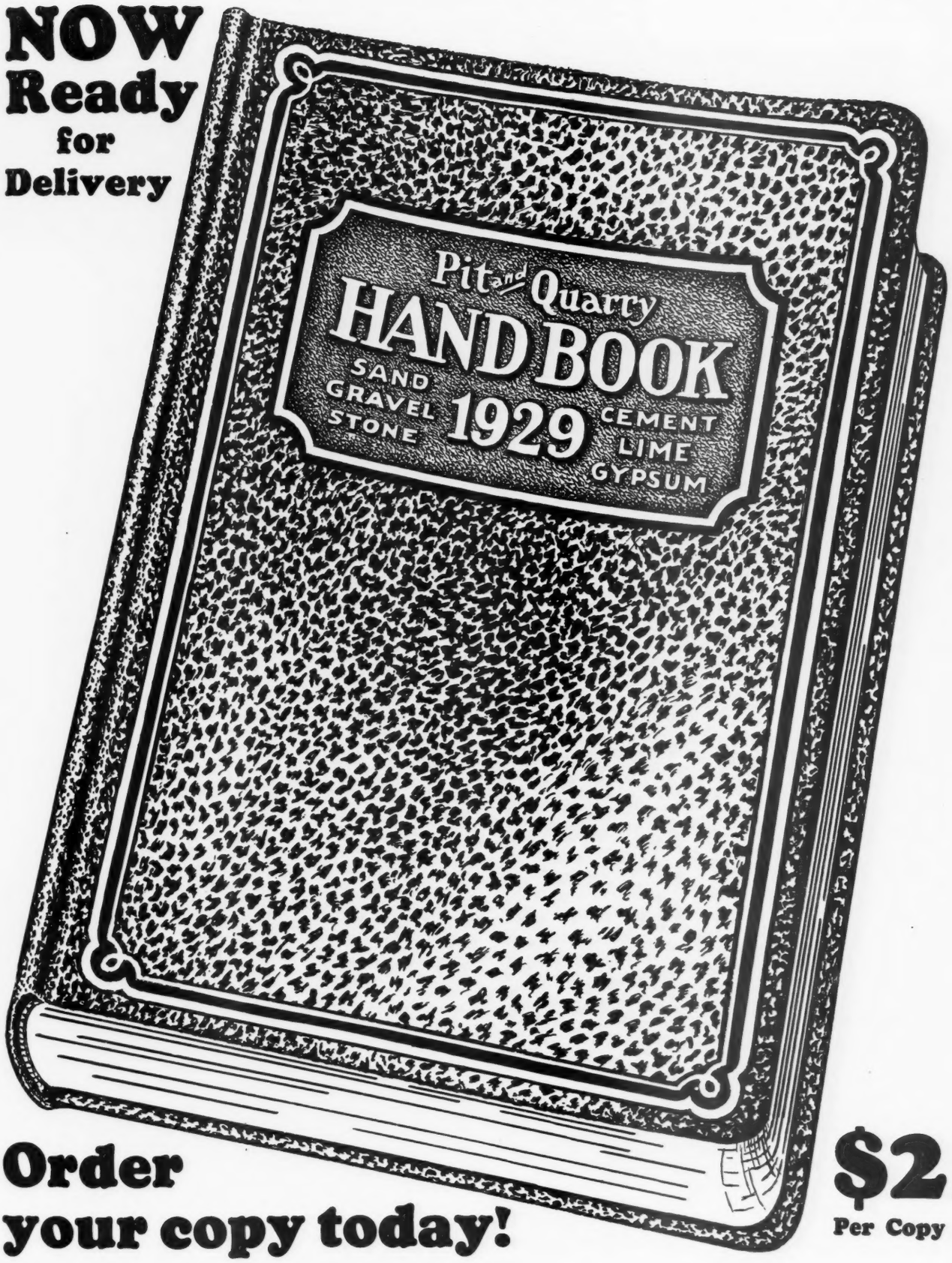

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Weightometers are ideal for weighing stone, gravel, sand, coal and hundreds of other conveyor-handled products.
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WILFLEY Centrifugal SAND PUMP
PATENTED
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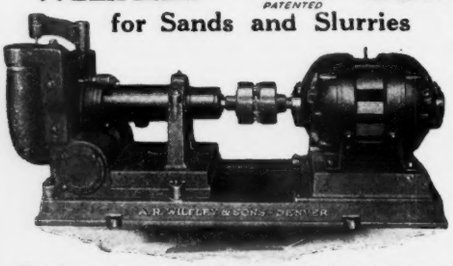

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Pump maintains extraordinary efficiency.
Wearing parts unusually heavy, insuring long life.

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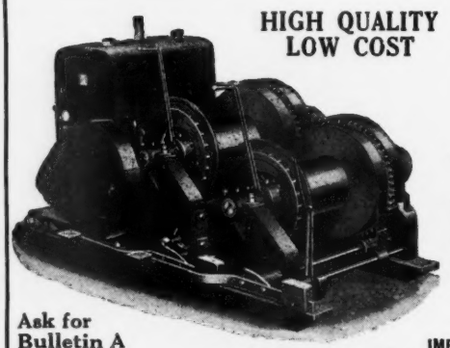

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Equipped with
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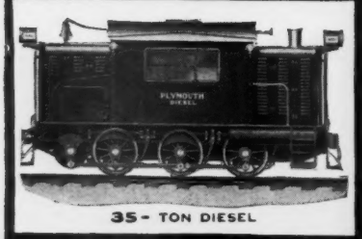

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IS COMPLETE FROM TWO TO EIGHTY TON SIZES. WRITE FOR CATALOG AND PERFORMANCE BULLETINS. TIME IS THE TEST. IT'S THE SAVING IN OPERATION COST THAT COUNTS.

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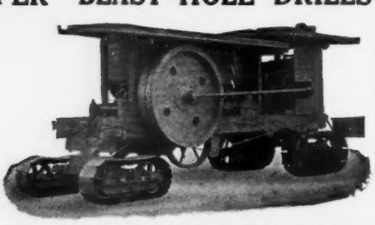

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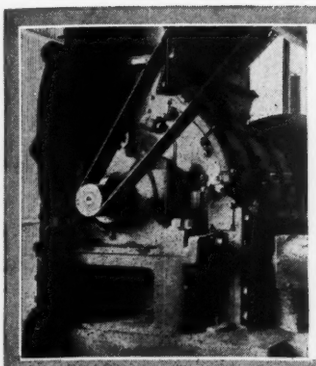

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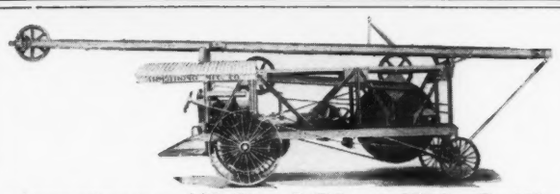

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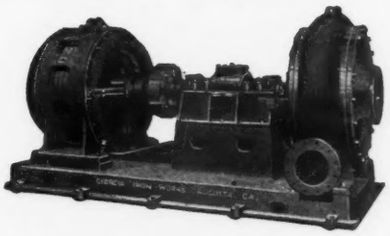

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MODELS "TWENTY-SEVEN" and "TWENTY-EIGHT"
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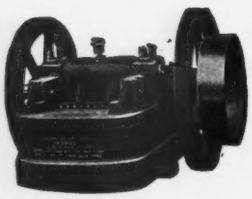

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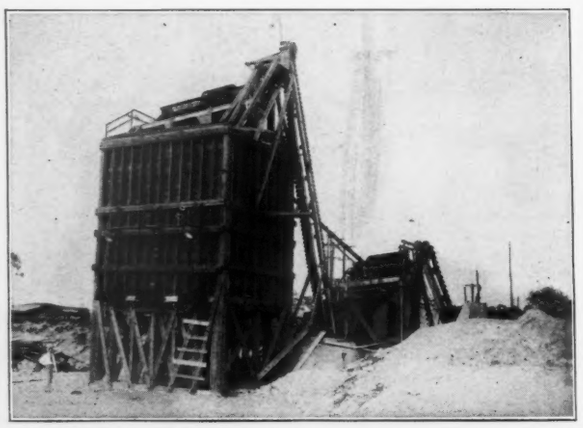

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A LIGHT flexible and moderate priced gas drive, traction shovel, usable with 3 different interchangeable scoops—**Skimmer, Ditcher and Clam Shell**—for Road Grading, Trenching, Back-filling, Cellar Digging, Pit Mining, Loading, Unloading and Handling Materials. Crawler mounted.

Has Climax 5½x7" engine; 57 H.P. at 800 R.P.M. Weighs 17 tons and handles ⅝ and 9/10 yd. **Skimmers** and full range of **Pullscoops.**

The Model 3 Keystone Shovel weighs 12 tons; handles ½ yd. buckets and has a 43 H.P. engine.

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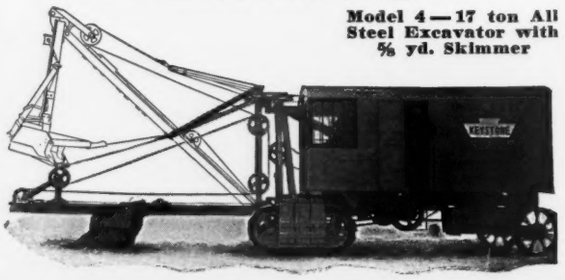

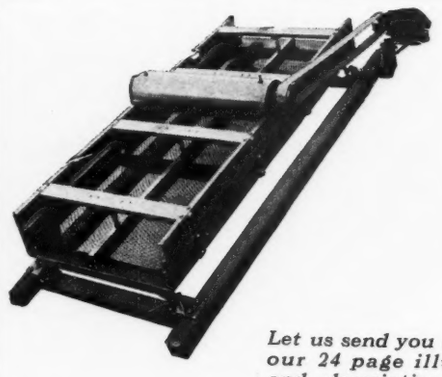

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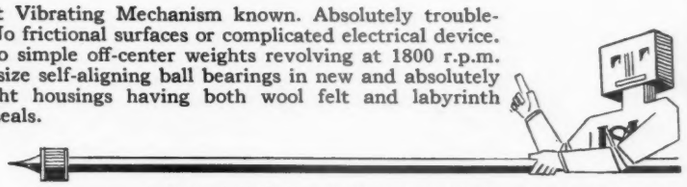

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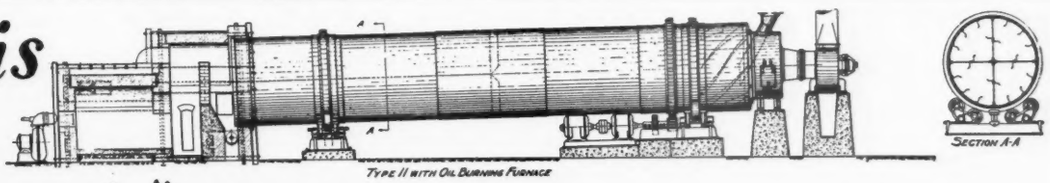

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THAT is why Prindle has developed 6 types of Dryers and six sizes for each. Each Dryer is built to do a particular task and built to do it well—so well that Prindle makes the following guarantee—

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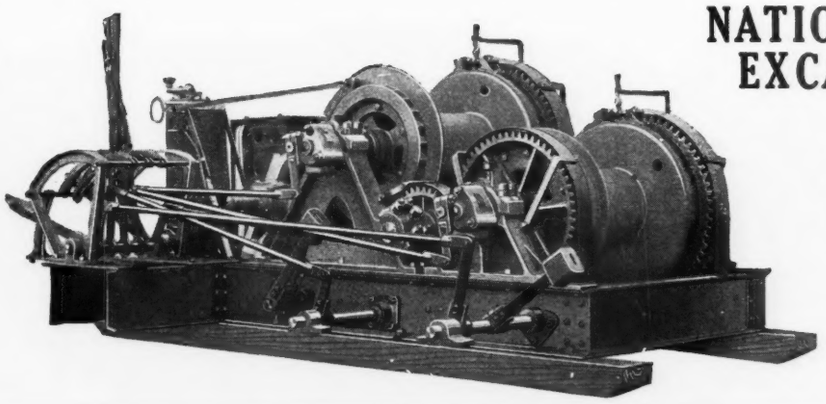

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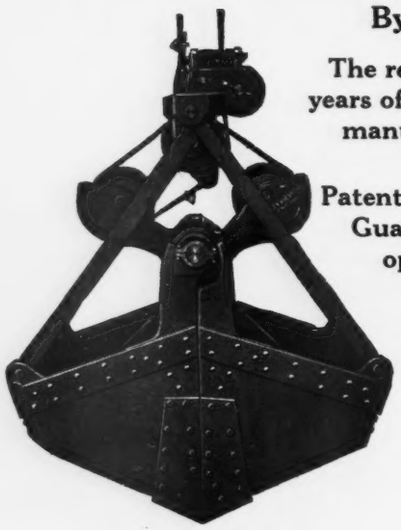

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The Westeeco Saw Tooth Hammer
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Jackson & Church Co. Machinery Is a Money Making Proposition

Many companies with surplus sand screenings or lime have found this to be so.

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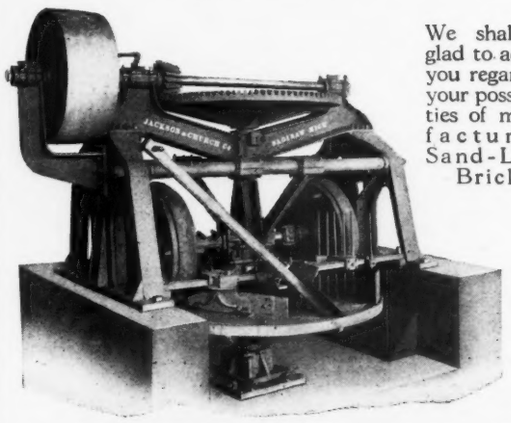

We shall be glad to advise you regarding your possibilities of manufacturing Sand-Lime Brick.

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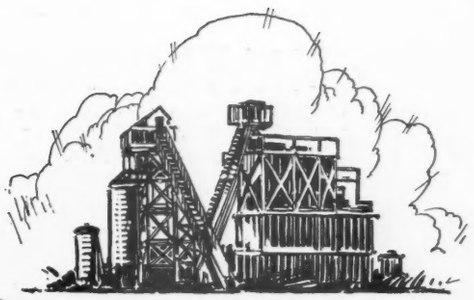
SAND LIME BRICK MACHINERY *Company* SAGINAW, MICH U. S. A.



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the Bakstad 3-Jaw Crusher, a unit having three crushers in one, a primary and two secondary crushers, actuated by the same mechanism required to operate one crusher. This unusual departure from the ordinary jaw crusher is accomplished by the addition of only two principal moving parts.

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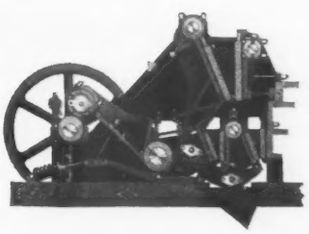

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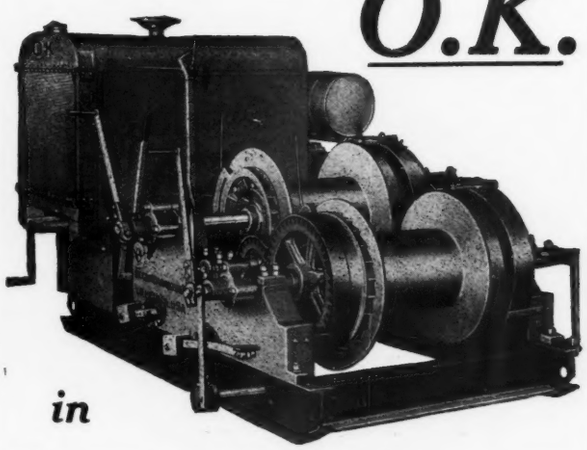

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O. K. Hoists increase efficiency and effect savings in operating costs. They reduce lost power to a minimum, and stand the hardest service without breakdowns. Ample reserve engine capacity—sturdy, and comparatively light in weight.

O. K. Hoists range from 8 to 150 H. P. in many different models. You are assured of getting a machine that exactly suits your requirements.

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PERFORATED METAL

SCREEN PLATES AND SECTIONS, BUCKETS, TROUGH CHUTES, ETC.

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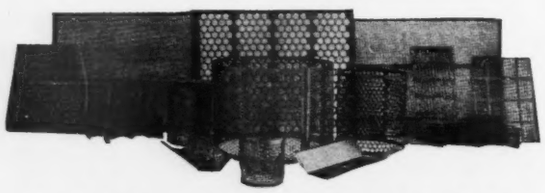
Some concerns prefer to deal with buyers who are easily satisfied; do not demand rush shipments and will overlook a little off quality.

We think differently. The more particular you are about your screen sections and buckets, the more exacting you are as to promptness and reliability;—the better chance there is of your becoming a permanent CROSS customer; and the best customer is the one who stays.

Catalog on Request



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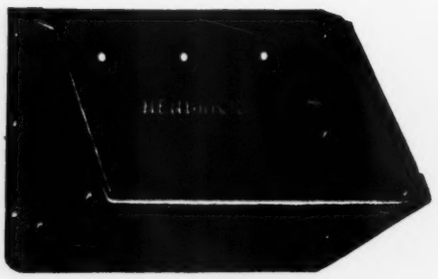

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THE same reason that leads customers to completely equip their plants with Hendrick Buckets should lead you to try out Hendrick Buckets on your elevator.

Hendrick Buckets have quality.

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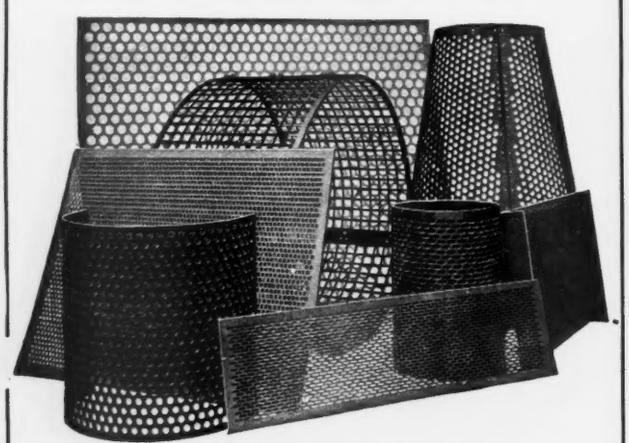
Perforated Metal — Screens of All Kinds — For Sand, Gravel, Stone, Etc.



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Perforated Screens for Every Purpose

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CHICAGO PERFORATING CO.
2435 West 24th Place
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PERFORATED METALS *and Screens*

For all purposes. Made to fit your equipment and to give full satisfaction—delivery when you want it.

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We use the best material for the purpose. Our deliveries and prices will please you.

STANDARD STAMPING *and* PERFORATING CO.
Offices and Works: 4721 Fifth Ave.,
Tel. Col. 6490 CHICAGO, ILL.

This re-designed gravel dredge raised the capacity from 60 to 70 tons an hour, to 150 to 160 tons an hour

AFTER five months' operation of the original dredge not more than 60 or 70 tons an hour could be delivered to the crushing plant. They then tried shooting the ground, using as much as 90 pounds of 30% explosive a day. This brought the yardage up to about 100 tons an hour, but nowhere near the capacity of the crushing plant.

At this time Yuba engineers were called in to see what was wrong and suggest improvements, if any. The dredge was re-designed, some new equipment installed, and for the past fourteen months deliveries of 150 to 160 tons an hour have been made.

Yuba offers important things:

1. *Dredge experience of 25 years.*
2. *Engineering council.*
3. *Complete new dredge plants; or parts for re-designed dredges.*

Yuba engineers have all had operating experience—an invaluable asset to all engaged in sand and gravel production.

Write us fully about your dredging problems

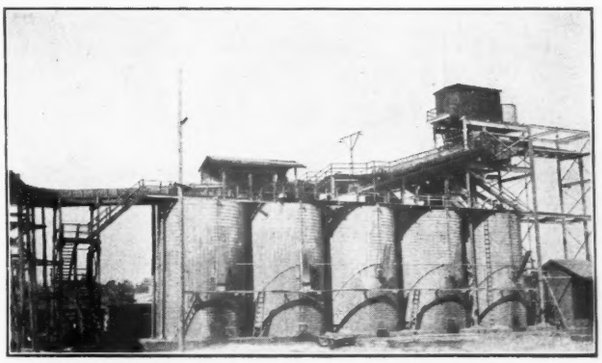
YUBA MANUFACTURING CO.

351 CALIFORNIA STREET • • SAN FRANCISCO, CALIFORNIA

J.H.C. 09

NEFF&FRY BINS

Popular with dealers in sand and gravel



Hundreds of N & F installations all over the country helping dealers in aggregate to reduce cost of doing business.

Neff & Fry bins eliminate shoveling and all loading equipment, simply open a gate and gravity loads your truck in less time than any other method ever used; also ideal for batching by weight or volume. Weather conditions or contents will not affect them in any manner. Once installed they will last indefinitely, growing stronger and stronger with age.

N & F bins feature the famous N & F super-concrete stave which interlocks with six adjoining staves in the completed structure to weld it into one rigid "everlasting" whole. This is the stave that won first place for hardness and strength at the Lewis Institute tests in Chicago.

N & F bins can be erected quickly and at reasonable cost. They can be taken down and re-erected elsewhere at low cost, should it become necessary to move. Their capacity can be increased merely by taking them down and rebuilding them wider, or by adding on at the top.

Investigate N & F bins. Learn of the advantages they can bring you.

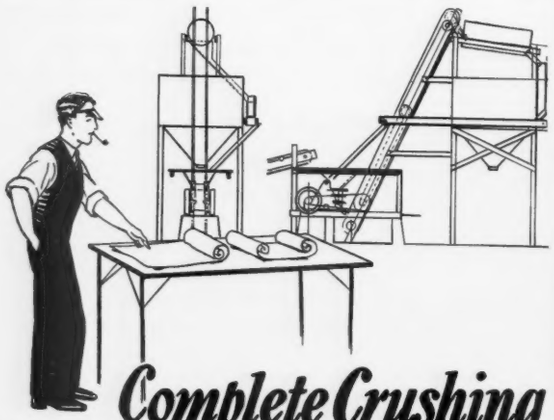
Write for Big General Catalog

The Neff & Fry Company

CAMDEN, OHIO

NEFF & FRY BINS

Super-Concrete Stave Storage Bins



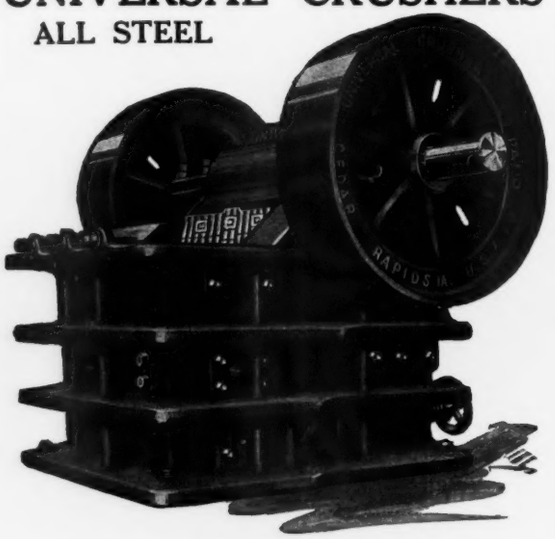
Complete Crushing Plants···planned without Cost to You!

Acme freely offers the services of its trained Engineering Department to help you make your plant a more efficient working unit.

Acme machinery—crushers, elevators, conveyors, screens, bins, washing plants, etc., in an Acme designed plant will give you the most efficient and economical setup possible.

ACME ROAD MACHINERY COMPANY, FRANKFORT, N.Y.

UNIVERSAL CRUSHERS
ALL STEEL



STRONG — for heavy duty
LIGHT — for portability

As a crushing unit with large capacity, strength to stand the severest strains of crushing, yet still light enough for portability, the Universal Crusher is without an equal. These crushers are of all steel construction, manganese equipped and instantly adjusted for fine or coarse crushing. Built in 22 sizes with capacity up to 450 tons per day.

Send for Circular See P&Q HAND BOOK Page 186

UNIVERSAL CRUSHER COMPANY
619 C. Avenue W. Cedar Rapids, Iowa

The Wood Rock Drill Works

The low first cost of Wood Tripod Drills together with the small amount which must be spent for repairs over a long period of years is something which should be of special interest to Highway Departments, Contractors and Operators of Quarries. Their quality is well known and they are guaranteed unconditionally. Either air or steam may be used to operate them and being manufactured in eight sizes, from the 2-inch to the giant 5-inch, which drills to fifty feet, exactly the right drill for each job may be selected.

Our No. 2 Jackhammer is a fast driller to twelve feet. List price $140.00 complete with steamcock, oiler and hole-blower ready for work. Full stock of steels, hose, couplings, blacksmith tools, etc.

Immediate Shipments

The Wood Rock Drill Works
30-36 Dale Avenue
PATERSON, NEW JERSEY

BAY CITY TRACTOR SHOVEL
⅜-yd. — ¾ Swing
10 Ton

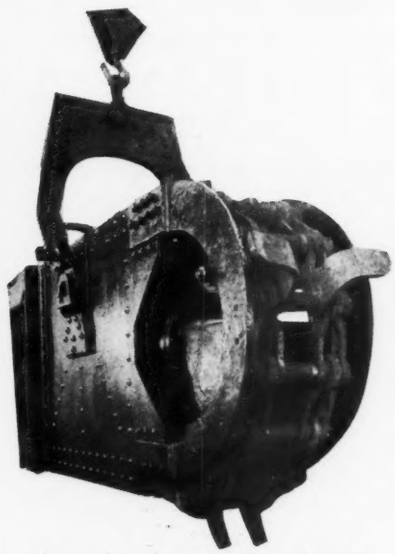
Model "R" ¾-yd.—25 Ton—Full Revolving
Also—Model "K" ½-yd.—full circle—13 Ton

BAY CITY SHOVELS, Inc. : Bay City, Mich.
(Formerly Bay City Dredge Works)

BAY-CITY

FULL OR PART CIRCLE CONVERTIBLE SHOVELS - CRANES

Be a Go-Getter—



The nozzle head manufactured only under Eagle "Swintek" patents. It has no equal.

More gravel can be taken from your deposit and at a lower production cost. Put in an Eagle "Swintek" Screen Nozzle Ladder and go after it. Don't sit back and try to pull it in with only a pump and a plain suction pipe.

The Ladder cuts through closely packed strata, digs right down into the deposit, agitates it and screens out the oversize boulders. There are no operating delays with an Eagle "Swintek" Screen Nozzle Ladder and with one you can have the increased production that other users are enjoying.

The Eagle "Swintek" Screen Nozzle Ladder has been imitated but never equaled in productive capacity—in durability—rugged strength—and in economy of operation, because its design is fundamentally correct and fully protected with exclusive patents.

Send for our new bulletin to investigate the results obtained through Eagle "Swintek" operation.

EAGLE IRON WORKS

Des Moines, Iowa

Sole Manufacturers of the

EAGLE "SWINTEK" SCREEN NOZZLE LADDER

Spry One-Man Electric Drill

ROTARY DRILLS

(With Type "B" Post)

will drill a two-inch hole six feet in four minutes. Can be furnished with various types of mounting. Send for catalogue "X" showing full line of **Electric, Air and Hand Power Machines.**

AUGERS ALL SHAPES AND LENGTHS.

Howells Mining Drill Co.

Est. 1878 Plymouth, Pa., U. S. A.

No Extra Men at the Feed Hopper

The *Moving* Breaker Plate, found only in the Dixie *Non-Clog* Hammermill, banishes all need for extra men at the feed hopper and it eliminates clogged feeding no matter how wet or sticky the material may be! Get the facts *now!* Write for free illustrated catalog.

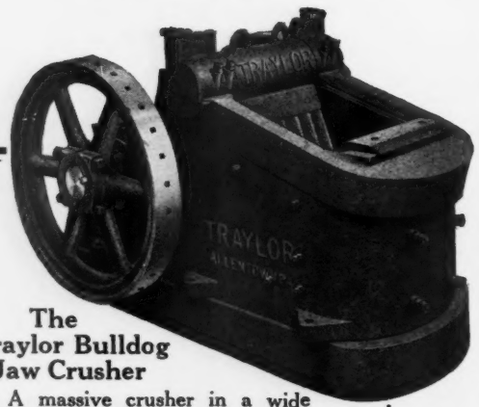
DIXIE

MACHINERY MFG. CO.

4207 GOODFELLOW AVE., ST. LOUIS

Also Makers of the Dixie Standard Stationary Breakerplate Hammermill

TRAYLOR TROUBLE-FREE EQUIPMENT

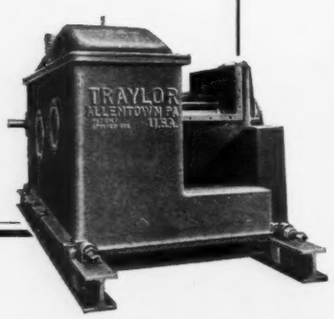


The Traylor Bulldog Jaw Crusher

A massive crusher in a wide range of sizes adapted to meet the primary crusher needs for plants of all capacities, or requirements. Send for Bulletin 2099.

A New Gear Reducer

Traylor introduced in 1928 a GEAR REDUCER for driving ROTARY KILNS, COOLERS and DRYERS which puts an end to troublesome gear train trouble. Write for details.



If it's made by Traylor it's the most troublefree equipment available. The dependability, the saving of power and reduction of maintenance costs which have always characterized all Traylor products, are the result of 30 years specialization in the manufacture of equipment for the crushed stone, gravel and cement industries.

THE TRAYLOR ENGINEERING & MANUFACTURING COMPANY ALLENTOWN, PA.

New York City 30 Church St. | Chicago 1414 Fisher Bldg. | Salt Lake City 101 W. 2nd So. St.
Los Angeles 605 Chester Williams Bldg. | Seattle 815 Alaska Bldg.
EXPORT—104 Pearl Street, New York City
FOREIGN SALES AGENCIES:
London, Lima, Valparaiso, Melbourne, Buenos Aires, Rangoon, Rio de Janeiro, Antofagasta, Iquique, Johannesburg, Santiago, Sydney, Sao Paulo, Oruro
EUROPEAN WORKS: Usines Carels Freres, Ghent, Belgium

WHEELING Roller Bearing CRUSHERS

Crusher troubles have been practically eliminated in the Wheeling. Satisfied operators everywhere are experiencing a degree of crusher efficiency they never before believed possible.

Greater tonnage at a better profit has become an established fact with Wheeling users. The roller bearings and the one-piece cast steel frame assure this performance at all times.

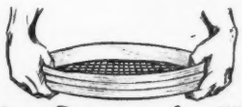
With no starting troubles, 40-50% lower power costs, friction and vibration practically eliminated, it is small wonder that the industry is looking to the Wheeling Roller Bearing Crusher as the solver of crushing problems once and for all.

Your next Crusher should be a Wheeling!

See P&Q HAND BOOK Page 187

Wheeling Mold & Foundry Co.
Wheeling, W. Va.

SUITABILITY OF EQUIPMENT
the key to better screening



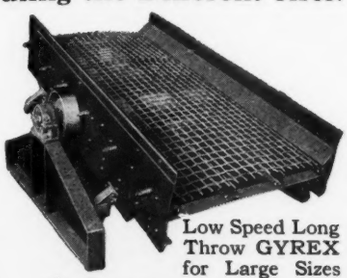
Robins Screens for Handling the Different Sizes.

. . . ever do any screening with a hand sieve?

What kind of a motion did you use on the large sizes? On medium sizes? On small sizes? Different motions, weren't they?

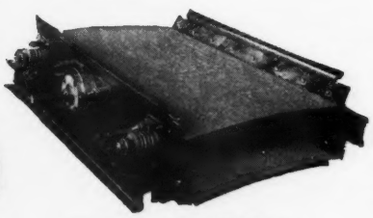
Screening on a tonnage basis, to be effective, should operate on those same sound principles. Screening out large pieces requires one combination of action, direction and amplitude. Medium size pieces another combination. Fines still another.

Obviously, such a range cannot be obtained from any one type of screen. It *can* be obtained by selecting from the Robins *full line of screens.*



Low Speed Long Throw GYREX for Large Sizes

High Speed Short Throw GYREX for Medium Sizes



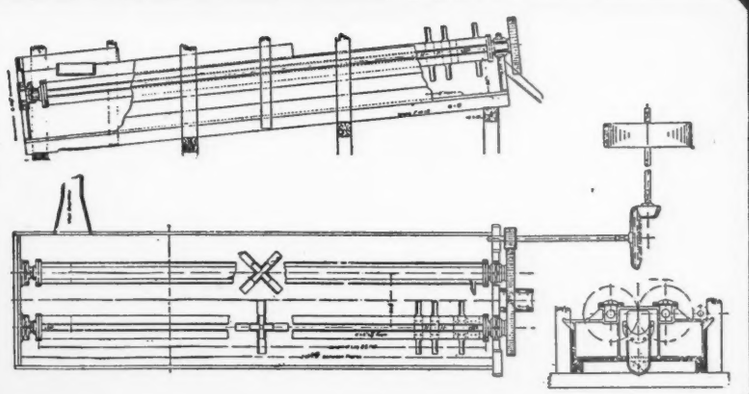
High Speed VIBREX for Small Sizes

Robins Conveying Belt Co.
NEW YORK CHICAGO

Boston Philadelphia Pittsburgh Los Angeles
London, England Johannesburg, South Africa

Representatives

Birmingham.....*C. B. Davis Engineering Co.*
Cardin, Okla.....*Ore Reclamation Co.*
New Orleans.....*A. M. Lockett & Co., Ltd.*
El Paso.....*Ammex Equipment Co.*
San Francisco.....*Joshua Hendy Iron Works*
Salt Lake City.....*The National Equipment Co.*
Seattle.....*B. F. Easterbrooks Co.*



For Clean Products

The McLanahan Improved Double Steel Log Washer guarantees that your products will be entirely free from clay, silt or other foreign matter. It puts you in a position to demand the highest market price for your product, because of the quality of the material you are selling.

This highly efficient washer is very simply and strongly constructed—will stand a world of abuse, and is easily accessible for the few repairs that may be necessary from time to time.

We also make single roll crushers in various sizes, and revolving screens to be used in conjunction with the crushers

Write for complete information.

McLANAHAN-STONE MACHINE CO.
HOLLIDAYSBURG -:- -:- PENNA.

What do you Wish of Your Pump?

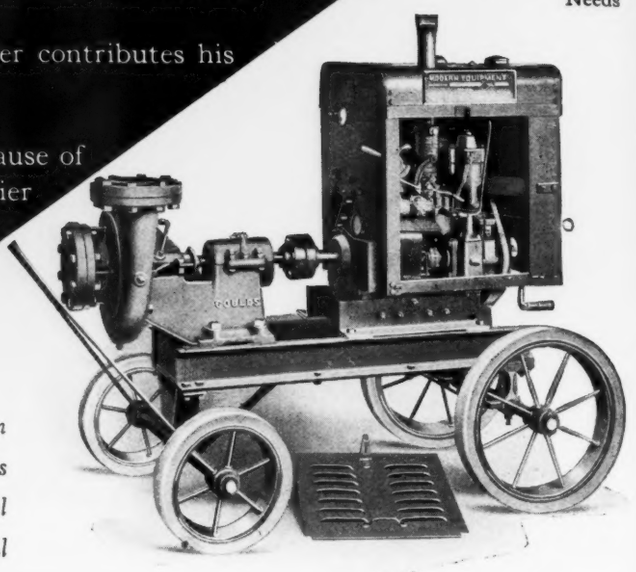
Proven? Through the exclusive use of such units as Continental Red Seal Engines, Gould Pumps, and Westinghouse Electric Motors.

Long Life? Assured because each supplier contributes his proven product and specialized engineering.

Quick Repair Service? Possible because of the innumerable repair stations each supplier maintains throughout the world.

Low Price? Surprisingly. The production facilities of our suppliers make this possible without sacrifice of quality.

Let's get together on your Pumping Needs



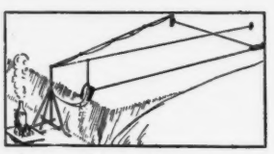
Diaphragm
Piston Types
Low Pressure Centrifugal
High Pressure Centrifugal

MODERN EQUIPMENT COMPANY
(Mc ILLWRIATH ST., MUSKEGON HEIGHTS)
MUSKEGON, MICHIGAN

We also make a complete line of
ENGINE DRIVEN
ELECTRIC GENERATORS

Mechanical Spreading one man operation!

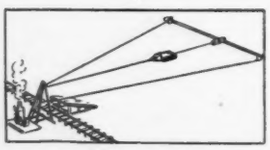
MECHANICAL spreading and one man operation spell economy of operation and greater production.



Type "B"

When you install Schofield-Burkett equipment you secure these two advantages. The mechanical spreading device which is responsible for efficient one man operation (two if steam power is used) is simple in design, fool proof, and dependable. It enables a single operator to produce a greater amount of material at less cost than any other excavator on the market.

Two types of excavators are provided, each designed especially for a definite class of work. The Type A is for sand, gravel, clay, stone, kaolin, coal, etc., excavation and loading while Type B is designed especially for stripping and filling in work. You can get just the equipment needed to do your work with dispatch and economy unequalled in the industry when you call on Schofield Burkett.



Type "A"

SCHOFIELD-BURKETT CONSTRUCTION CO.
504 Bibb Bldg., Macon, Ga.

There is only 1 way to protect a crusher

Dings High Intensity MAGNETIC SEPARATION

A Dings magnetic separator is the only way you can stop tramp iron from reaching your crushers. Traps fill with rock and let the metal slide by; spring devices at their best only partially soften the blow.

A Dings separator absolutely throws aside every particle of metal. None can pass. How much of the $2,100,000 yearly repair bill on crusher equipment belongs in your plant? A Dings magnetic separator will stop most of it and pay for itself in a few months time.

DINGS MAGNETIC SEPARATOR CO.,
670 Smith St., Milwaukee, Wis.
Established in 1899

NEW YORK CITY
30 Church Street
BOSTON
304 Rice Building
SAN FRANCISCO
419 Call Building
SEATTLE
2208 First Ave., S.
Branch offices in other principal cities

P & Q 3-27 Gray

CORDEAU-BICKFORD
DETONATING FUSE

FOR SAFETY AND EFFICIENCY

One of the most modern crushed stone plants in America is that of Dolomite Inc., Maple Grove, Ohio.

Noteworthy because of its most unusual efficiency, this plant has a capacity of 4000 tons per day, maintained consistently because of the many new mechanical features incorporated into this modern plant.

This company in the interest of efficiency, found it necessary to install the latest equipment and for the same reason, they continue to use Cordeau-Bickford that hundreds of other crushed stone producers are using today.
Cordeau-Bickford Safety Fuses are sure detonating agents made in sufficient varieties to suit every class of blasting work.

THE ENSIGN-BICKFORD COMPANY, SIMSBURY, CONN.

Established 1836 **Original Makers of Safety Fuse**

DAVISON COKE & IRON COMPANY

All Structures and Foundations

Designed

and

Constructed

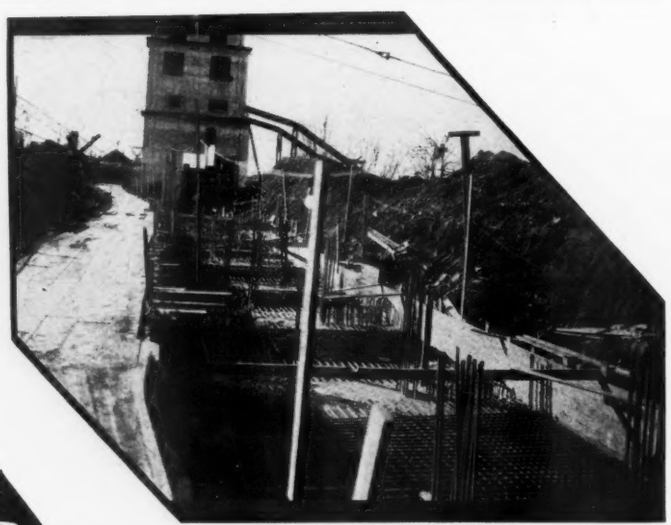
by

THE RUST ENGINEERING COMPANY

Sixth Ave. and Grant St. :: Pittsburgh, Penn.

Experience

Proves Its Worth on the Hard Jobs!



YEARS of experience enables us to offer a dependable service on difficult foundations and Engineering Structures, LARGE OR SMALL, with facilities for meeting every building requirement.

B

BURRELL

ENGINEERING *and* CONSTRUCTION COMPANY

513 JACKSON BLVD. **CHICAGO, ILL.**